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WILDERNESS PLANNING AMENDMENT/ ENVIRONMENTAL IMPACT STATEMENT FOR THE DILLON RESOURCE AREA

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DRAFT

WILDERNESS PLANNING AMENDMENT/ENVIRONMENTAL IMPACT STATEMENT

for the

DILLON RESOURCE AREA

Beaverhead and Madison Counties
Montana

Prepared by

BUREAU OF LAND MANAGEMENT
UNITED STATES DEPARTMENT OF THE INTERIOR

Michael J. Penfold

STATE DIRECTOR
MONTANA STATE OFFICE

MAY 1982

ABSTRACT: This Wilderness Planning Amendment/Environmental Impact Statement considers the suitability or nonsuitability of eight Wilderness Study Areas (WSAs) in the Dillon Resource Area for inclusion in the National Wilderness Preservation System. The proposed action recommends that portions of three WSAs—the Ruby Mountains, the Blacktail Mountains, and Farlin Creek—totaling 27,211 acres, be designated as wilderness. The proposed action also recommends that the remaining areas totaling 67,198 acres, not be designated as wilderness.

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Comments must be received by:
July 26, 1982

SUMMARY

PURPOSE OF STUDY

As required by Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA), the purpose of this study is to determine the suitability or nonsuitability of eight Wilderness Study Areas (WSAs) for designation as wilderness, in accordance with quidelines in the Wilderness Act of 1964. These WSAs are located in Beaverhead and Madison counties in southwestern Montana and managed by the Bureau of Land Management (BLM) in its Dillon Resource Area, Butte District.

STUDY RECOMMENDATIONS

The BLM proposes wilderness designation for 27,211 acres of public lands located in portions of three WSAs—Ruby Mountains, Blacktail Mountains and Farlin Creek—and nonwilderness for 67,198 acres of public land located in the remaining portions of the above WSAs and the other five WSAs.

A total of 15,615 acres in the Ruby Mountains WSA, and 10,986 acres in the Blacktail Mountains WSA are recommended for wilderness. The recommendations for both WSAs provide wilderness protection for the areas with the highest wilderness quality; improve wilderness manageability; and minimize or eliminate conflicts with other activities such as timber, motorized recreation, minerals, grazing, and access to private inholdings. One area with high potential for the occurrence of talc is included in the recommended wilderness portion of the Ruby Mountains WSA, but there are several other high potential areas to the south, both outside the WSA and in the nonwilderness portion of the WSA, that are more accessible and available for development.

The Farlin Creek WSA proposal recommends 610 acres for wilderness designation as a tack-on to the Forest Service's proposed East Pioneer Wilderness, and transfer of management authority to the Forest Service if the area is designated wilderness. If the Forest Service unit is not ultimately designated as wilderness, Farlin Creek is not a viable independent candidate for wilderness status. The Farlin Creek proposal would add to the physiographic unity, scenic quality, and manageability of the adjacent portion of the proposed East Pioneer Wilderness.

The five remaining WSAs—East Fork of Blacktail Deer Creek, Hidden Pasture Creek, Bell and Limekiln Canyons, Henneberry Ridge, and Axolotl Lakes—are recommended for nonwilderness due to one or a combination of factors, including low wilderness quality; wilderness manageability problems; and conflicts with other resources such as timber, minerals, livestock grazing, and motorized recreation.

ALTERNATIVES CONSIDERED

Three alternatives were initially considered for all WSAs—all wilderness, partial wilderness, and no wilderness. Partial wilderness alternatives were developed only if they presented an opportunity to improve manageability or wilderness quality or to reduce resource conflicts. For some WSAs there was not enough difference between the partial and all wilderness alternatives to warrant separate analysis; therefore, alternatives for partial wilderness designation were analyzed for only four WSAs—Ruby Mountains, Blacktail Mountains, Farlin Creek, and Henneberry Ridge.

PUBLIC ISSUES

Some of the more important issues raised by the public included the effect of wilderness designation on such activities as mining, timber, grazing, motorized recreation activities, and the related impact on the economy of the local area.

ENVIRONMENTAL CONSEQUENCES

Impacts resulting from the study recommendations are described below.

Wilderness

Wilderness values would be provided long-term (legislative) protection in all areas recommended for wilderness. In those areas recommended for nonwilderness, wilderness values could be degraded through multiple-use trade-offs.

Recreation

There would be a minimal impact on motorized recreation. Eight miles of vehicle ways would be closed.

Scenic Values

Provide additional protection for scenic values in areas recommended for wilderness. In areas recommended for nonwilderness, scenic values would be managed in accordance with the current land use plan.

Cultural Resources and Watershed

Wilderness designation would have a slightly more beneficial effect on cultural values and soil and water resources than would nonwilderness designation.

Wildlife

Wilderness designation would provide certain types of long term protection for wildlife, but nonwilderness designation could also provide protection for wildlife.

Minerals

Opportunities for exploration or development could be restricted or forgone in areas recommended for wilderness.

Livestock Grazing

There is no anticipated effect on stocking levels, and relatively low additional costs to livestock operators due to possible restrictions on motorized vehicles in WSAs recommended for wilderness designation.

Timber

In the Farlin Creek WSA, a potential timber harvest of 0.4 million board feet per decade would be forgone. About 3.8 million board feet per decade would be released for timber management.

Socio-Economic

Regional effects of the study recommendations are too small to measure. Local economic effects primarily involve restrictions to mineral and timber development. Restrictions to timber harvesting would result in the loss of about one-quarter of a job per year in all facets of logging and milling.

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INTRODUCTION

PURPOSE AND NEED FOR THE ACTION

The purpose of this study is to determine the suitability or nonsuitability of eight wilderness study areas for designation as wilderness, in accordance with guidelines in the Wilderness Act of 1964. These wilderness study areas (WSAs) are on land managed by the Bureau of Land Management (BLM) in its Dillon Resource Area, Butte District, Montana.

Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) directs the Secretary of the Interior to have the BLM study all public lands under its jurisdiction for their wilderness potential. Following the study, the Secretary of the Interior will make recommendations to the President as to which areas or portions of areas should be designated as wilderness. The President then will make a final recommendation to Congress. Congress must ultimately decide which areas, if any, will be designated wilderness.

If Congress decides that some or all of the WSAs are to be designated wilderness, the BLM will amend the Dillon Management Framework Plan (MFP), which was completed in 1979, to indicate wilderness management of those areas. This study does not consider how the WSAs will be managed if they are found to be unsuitable for wilderness designation, since nonwilderness land use decisions already are detailed in the Dillon MFP. Any of the WSAs that are designated wilderness by Congress will then be managed in accordance with the Wilderness Management Policy document published by the BLM in September, 1981.

The study process has been guided by the Bureau of Land Management's draft wilderness study policy and by BLM planning regulations. Much of the information used in this study also appears in the Dillon MFP and in the *Mountain Foothills Grazing Management Program: Environmental Impact Statement* (BLM 1980—hereafter cited as "Mountain Foothills EIS"). All maps referenced are contained in a separate map supplement which accompanies this document.

AREA DESCRIPTION

The eight WSAs are all located in Beaverhead and Madison counties in southwestern Montana, within the BLM's Dillon Resource Area which contains about 950,000 acres of public land (See Location map). Topographic and natural features within the resource area are extremely diverse, ranging from nearly level, broad valleys with elevations above 5,000 feet to irrigated uplands, sagebrush/grasslands, and mountain peaks reaching above 11,000 feet. The WSAs in the Dillon Resource Area contain examples of most of these features. The eight WSAs discussed in this study cover a total of 94,228 acres, which is slightly less than 10% of the public land in the resource area.

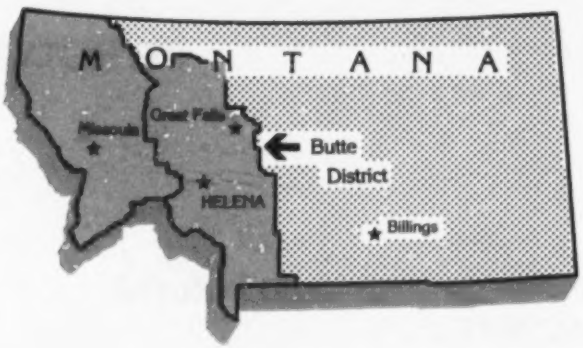
There are two other WSAs in the Dillon Resource Area that will not be covered by this study: the Tobacco Root Tack-ons, MT-076-063, 860 acres; and the Madison Tack-ons, MT-076-079, 1,509 acres. The Tobacco Root Tack-ons will be studied in conjunction with the Forest Service's further planning area, Middle Mountain-Tobacco Roots, as part of the Deerlodge National Forest management plan. The Madison Tack-ons unit has been included in the Forest Service's draft study of the Taylor-Hilgard Wilderness Study Act area, which was published in September 1980.

There are three former BLM primitive areas in the Dillon Resource Area. Wilderness inventory and study of one of these areas, the Centennial Mountains, has been postponed. Preliminary partial wilderness recommendations have been issued for the other two areas: Bear Trap Canyon (5,463 acres, including adjacent national forest land) and Humbug Spires (11,175 acres).

THE PLANNING PROCESS

The process used in this study incorporated various aspects of the BLM planning regulations, the Draft Wilderness Study Policy and Council on Environmental Quality (CEQ) regulations. This document serves both as an amendment to the Dillon MFP and as a draft environmental impact statement. The major steps in the wilderness study process are as follows:

1) Scoping and issue identification
2) Public input
3) Data collection
4) Development of affected environmental chapter (Chapter 1)
5) Definition of alternatives
6) Evaluation of impacts of alternatives
7) Selection of the preferred alternatives
8) Publishing draft document for public review
9) A 60-day comment period, including public hearings
10) An analysis of public comments
11) Preparation of final Wilderness Planning Amendment/Environmental Impact Statement (WPA/EIS)



Location Map
Dillon Wilderness Planning Amendment/EIS
for the Dillon Resource Area

12) BLM Washington office review of final WPA/EIS
13) Secretary of the Interior's release of final WPA/EIS and recommendation to the President
14) The President's recommendation to Congress
15) Congressional action

The current schedule calls for the public comment period on this, the draft document, to end July 26, 1982, and a preliminary final WPA/EIS to be submitted for Washington office review by September 30, 1982. The recommendations made by the Secretary of the Interior will become final 30 days after the final WPA/EIS is released to the public.

STATEMENT OF NONCONFORMANCE

The proposed action is not in conformance with the existing Dillon MFP because the MFP did not include wilderness suitability recommendations as part of its multiple use decisions. The MFP indicated only that the wilderness inventory was in progress and recommendations concerning the suitability or nonsuitability of any areas under study would be made later. This document is the vehicle through which those recommendations are being made. They will ultimately be incorporated into the existing Dillon MFP.

ISSUES AND CRITERIA

Planning Criteria

The Wilderness Study Policy (WSP) directs the BLM to base its wilderness suitability recommendations on the following planning criteria.

Requirements for Areas Recommended as Suitable for Wilderness Designation

Benefits. The BLM will determine what resource values are present and whether those values would be adversely or beneficially affected by wilderness designation. The multiple resource benefits and intrinsic wilderness values must balance those resource uses which would be forgone over the long term.

Manageability. The BLM will determine whether the area is capable of being effectively managed to preserve its wilderness character over the long term.

Public Comment

The BLM will consider comments received by interested and affected publics at all levels—local, state, regional and national. Wilderness recommendations will not be based exclusively on a vote-counting majority rule system. The BLM will develop its recommendations by considering public comment in conjunction with its analysis of a wilderness study area's wilderness, multiple resource, and social and economic values and uses.

Local Social and Economic Effects

The BLM will give special attention to adverse or favorable social and economic effects which wilderness designation would have on local areas.

Consistency with Other Plans

The BLM will consider the extent to which the suitability recommendation is consistent with officially approved and adopted resource-related plans of other federal agencies, state and local governments, and Indian tribes (and the policies and programs contained in those plans).

Impacts on Other Resources

The BLM will consider the extent to which other resource values or uses of the area would be forgone or adversely affected as a result of wilderness designation.

Impacts of Nondesignation on Wilderness Values

The BLM will consider the alternate use of the land under study if the area is not designated as wilderness, and the extent to which the wilderness values of the area would be forgone or adversely affected as a result of this use.

Evaluation of Wilderness Values

The BLM will consider the extent to which each of the components listed below contributes to the overall value of an area for wilderness purposes.

Mandatory Wilderness Characteristics: the quality of an area's wilderness characteristics—size, naturalness, and outstanding opportunities for solitude or primitive recreation.

Special Features: the presence or absence, and the quality of the optional wilderness characteristics—ecological, geological, or other features of scientific, educational, scenic, or historic value.

Multiple Resource Benefits: the benefits to other multiple resource values and uses which only wilderness designation could ensure.

Diversity in the National Wilderness Preservation System (NWPS)

The BLM will consider the extent to which wilderness designation of the area under study would contribute to expanding the diversity of the NWPS with respect to the factors listed below.

Ecosystem and Landform: expanding the diversity of natural systems and features, as represented by ecosystems and landforms.

Proximity to Population Centers: assessing the opportunities for solitude or primitive recreation within

a day's driving time (5 hours) of major population centers.

Geographic Distribution: balancing the geographic distribution of wilderness areas.

Major Issues

Specific issues addressed under the above criteria were formulated from an analysis of all public comments received during the inventory phase of the wilderness review process between the fall of 1978 and spring of 1980, comments received during a formal 30-day comment period on issue identification that ended June 13, 1981, and the professional judgements of BLM specialists. BLM specialists based data requirements and their method of analysis on these issues, which follow below. Under each issue is indicated the relevant planning criteria on which the suitability recommendation for specific WSAs is based.

Energy Resources and Leasable Minerals: the potential a WSA might have for oil and gas, coal, oil shale, and other energy resources or leasable minerals, and what effect wilderness designation would have on the development of these resources. This issue is addressed through the application of criteria 4 and 6 of the WSP.

Locatable Minerals: the potential a WSA might have for hardrock minerals, both those listed in the National Defense Stockpile Inventory of Strategic and Critical Materials and all others, and what effect wilderness designation would have on the development of these resources. This issue is addressed through the application of criteria 4 and 6 of the WSP. That application includes consideration of the rights granted by the 1872 mining law, access rights and needs, potential mineral withdrawal, and the provisions of the BLM Wilderness Management Policy.

Livestock Grazing: the existing uses (including level of use, vehicle access, and use and maintenance of existing improvements), proposed management and improvements, long-term forage potential, and the effect wilderness designation would have on livestock operations. This issue is addressed under criterion 6 of the WSP. Consideration is given to the increased cost and inconvenience of livestock operations, what new range improvements would be allowed, any potential forage that would be forgone, and any change in property values.

Timber: the timber potential of each WSA, taking into account such limiting factors as slope, soils, and other factors affecting the feasibility of harvesting timber. The issue is addressed under criterion 6 of the WSP. The potential for supplying domestic fuelwood is also considered.

Adjacent Lands and Land Uses: the existing and potential uses of WSAs and land adjacent to WSAs, and the extent to which wilderness designation would affect adjacent lands. The issue is addressed under criteria 6 and 8c of the WSP. Consideration is given to the effects of possible air quality redesignation, displacement of motorized recreation onto adjacent lands, and trespass problems on private lands caused by an increase in visitors. Also considered are possible benefits such as the maintenance of scenic vistas and essential wildlife habitat for populations found seasonally on other lands.

Recreation Opportunities: the opportunities for recreation afforded by a WSA. We consider both the opportunities for motorized recreation that would be forgone if the area were designated wilderness and the opportunities for primitive recreation that would be gained. This issue is addressed through the application of criteria 6 and 8 of the WSP.

Wildlife: the effect wilderness designation would have on wildlife populations, distribution, and habitat and on the opportunities for wildlife management. These effects, which could be either positive or negative, are dealt with through the application of criteria 6 and 8c of the WSP.

Threatened and Endangered Species: the presence or absence of any threatened or endangered plant or animal species within a WSA, as well as any potential there may be for the reintroduction of such species. Wilderness designation could prove to be either beneficial or detrimental to a threatened or endangered species; therefore, this issue is addressed under either criterion 6 or criterion 8c of the WSP.

Watershed Values: the present condition and uses of watersheds within each WSA, the water quality and quantity of streams within and downstream of each WSA, and the relative sensitivity of those watersheds to development activities. We consider the adverse or beneficial impacts to watershed values that would result from wilderness designation. The issue is addressed under criteria 6 and 8c of the WSP.

Wilderness Quality: the wilderness values of each WSA—size, naturalness, outstanding opportunities for solitude or primitive recreation, special features, and multiple resource benefits. The issue is addressed under criterion 8 of the WSP.

Ecological Diversity and Geographical Distribution: the degree to which each WSA might contribute to expanding the geographical distribution and ecological diversity of the National Wilderness Preservation System. The Bailey-Kuchler system is used to display the existing ecological diversity of the NWPS and the ecotypes present in each WSA. We address this attribute through the application of criteria 9a and 9c of the WSP.

Outside Sights and Sounds: the kinds and severity of outside sights and sounds that are apparent from within a WSA and to what extent they affect the wilderness qualities of an area, especially the apparent naturalness and the opportunities for solitude. The issue is addressed under criteria 8a and 1b of the WSP.

Manageability: the ability of the BLM to manage each WSA as wilderness in perpetuity. We consider the nature of the boundaries, the configuration of the area, patterns of ownership, nonconforming existing rights, and the potential for reducing manageability problems through boundary revision. The issue is addressed under criterion 1b of the WSP.

Local Socioeconomic Effects: any significant positive or negative effects on local social or economic conditions. Consideration is given to the effects of designation or nondesignation on employment, income, timber supply, energy and mineral development, community stability, and recreation demand. This issue is addressed under criterion 3 of the WSP.

These issues and criteria were used in this study to choose necessary data, define alternatives, evaluate the impacts of the alternatives, select a preferred alternative for each area, and then evaluate the cumulative impact of the preferred alternatives. In most cases the data related to these issues have been analyzed relative to specific WSAs, while in some cases the application has been in a general fashion for those aspects common to all WSAs.

For the Farlin Creek WSA, as a tack-on to a Forest Service roadless area recommended as wilderness, the following additional factors will be considered:

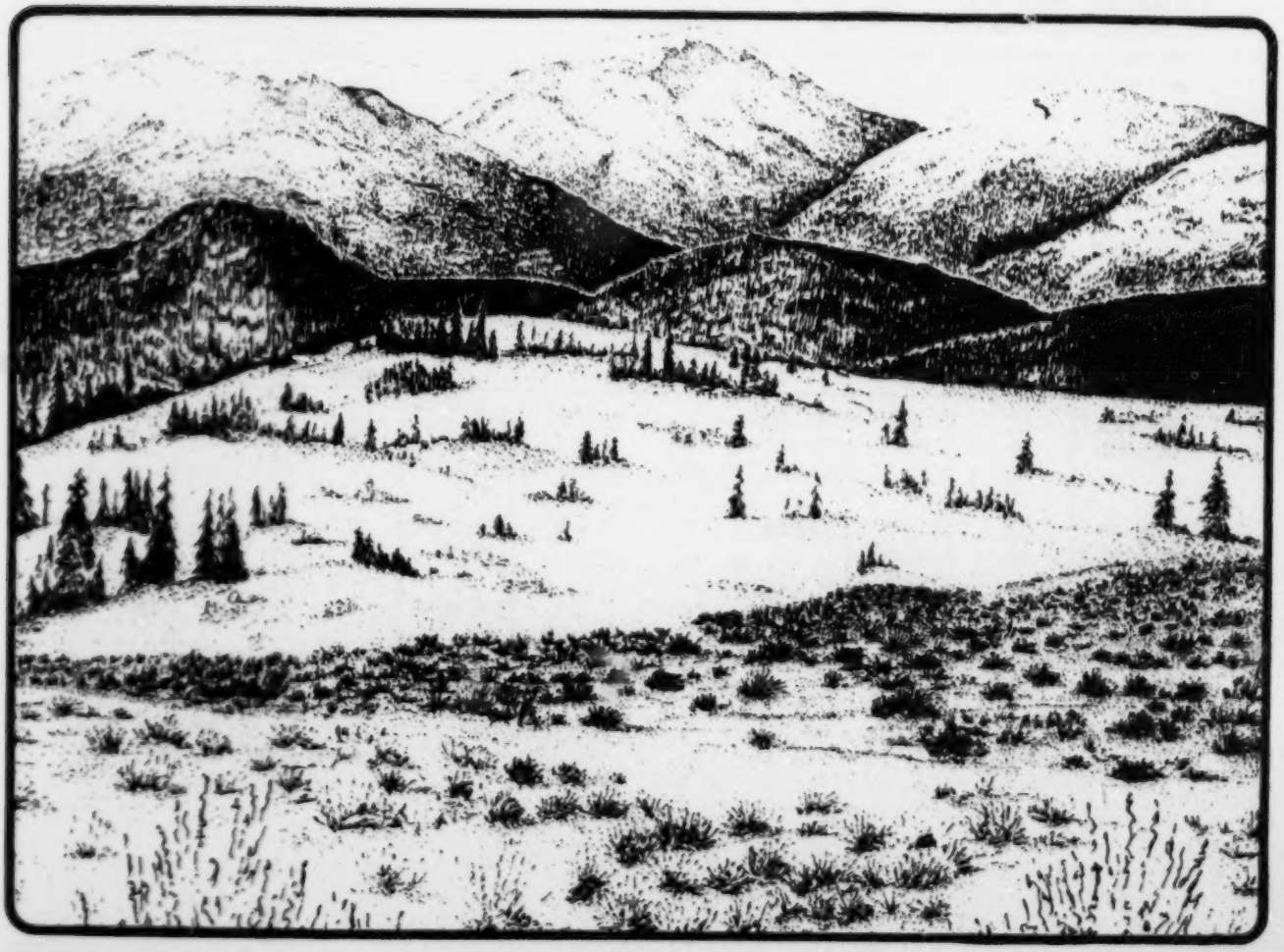
1. Will designation of the WSA as wilderness benefit the values and uses of the existing or proposed wilderness area?

2. Would the WSA be a viable independent candidate for designation as wilderness if Congress does not designate the contiguous lands?

3. Could the BLM portion be more effectively managed as wilderness if the management responsibility were transferred to the agency which administers the contiguous existing or proposed wilderness area?

Finally, there were some public concerns expressed during issue identification that are covered by provisions of the BLM's Wilderness Management Policy and are not directly related to wilderness suitability. These concerns centered on effects of wilderness designation on adjacent lands and land uses, particularly in regard to noxious weeds, insects and disease, and fire management. Basically, these elements can be controlled under wilderness management if they pose a real and significant threat to adjacent lands, or to uses within a wilderness area. However, the methods used will generally be the least impairing to the wilderness resource.

Chapter 1
The Affected Environment



ANALYSIS OF FACTORS COMMON TO ALL WSAS

The eight WSAs discussed in this report are in Beaverhead and Madison counties, Montana. They cover a total of 94,228 acres, as follows:

Ruby Mountains	MT-076-001	26,611 acres
Blacktail Mountains	MT-076-002	17,479 acres
East Fork of Blacktail Deer Creek	MT-076-007	6,230 acres
Hidden Pasture Creek	MT-076-022	15,509 acres
Bell and Limekiln Canyons	MT-076-026	9,650 acres
Henneberry Ridge	MT-076-028	9,806 acres
Farlin Creek	MT-076-034	1,139 acres
Axolotl Lakes	MT-076-069	7,804 acres

The acreages listed here differ slightly from those reported in the intensive inventory because they have been recalculated with greater accuracy.

The Farlin Creek WSA, which is less than 5,000 acres, is considered here only as a possible addition ("tack-on") to the East Pioneer area of the Beaverhead National Forest, which has been proposed for wilderness designation.

WILDERNESS OVERVIEW

Wilderness Opportunities

National and Regional Opportunities

The National Wilderness Preservation System (NWPS) comprised 263 units as of December 31, 1980. These units covered a total acreage of 79,810,741 acres. Of this, 56,393,201 acres (about 70%) is in Alaska; 23,417,540 acres are in the lower 48 states and Hawaii.

A three-state area—Montana, Idaho, and Wyoming—is considered the affected region for purposes of this study. Table 1 summarizes by state the designated wilderness areas, areas that have received presidential recommendations for wilderness designation, and areas that are to be studied further for possible wilderness designation. The three-state region, which essentially encompasses the Northern Rocky Mountains, contains some of the most extensive opportunities in the country in designated and de facto wilderness areas. The Regional Wilderness Opportunities map shows the locations of these.

TABLE 1
REGIONAL WILDERNESS OPPORTUNITIES

State	Designated Wilderness Areas			Presidentially Endorsed Areas			Further Study Areas		
	Agency	Number of Areas	Acres	Agency	Number of Areas	Acres	Agency	Number of Areas	Acres
Montana	FS	11	3,107,342	NPS	2	1,084,660	FS	25	1,207,769
	FWS	3	64,997	FS	34	681,812	BLM	45	486,655
				FWS	15	161,480			
Idaho	FS	5	3,835,479	FS	17	1,240,424	FS	11	571,931
	NPS	1	43,243				BLM	69	1,727,030
Wyoming	FS	6	2,194,303	FS	17	627,100	FS	7	414,870
				NPS	2	1,848,744	BLM	48	578,161

BLM = Bureau of Land Management
FS = Forest Service
FWS = Fish and Wildlife Service
NPS = National Park Service

Opportunities in Montana

Montana contains 3,172,339 acres in 14 designated wilderness areas, 1,927,952 acres in 51 presidentially endorsed areas, and 1,677,774 acres in 70 further study units. About 28% of the acreage in further study areas in the state is on BLM-administered land. There are no designated wilderness areas or areas that have received presidential endorsement on BLM land in Montana.

Two cities that qualify as "standard metropolitan statistical areas" (SMSAs) as defined by the Bureau of the Census, U.S. Department of Commerce, are within five hours' driving time of some of the study areas being considered here. Billings, Montana, which has a metropolitan population of 108,035, is within five hours of two of the WSAs; Great Falls, where the SMSA population is 80,696, is within five hours of six WSAs.

The two cities are near unusually rich wilderness opportunities. Within five hours of Billings there are 5 designated wilderness areas totaling 2,007,274 acres, 27 presidentially endorsed areas totaling 1,449,062 acres, and 40 further study areas totaling 1,024,627 acres. The opportunities within five hours of Great Falls are 12 designated wilderness areas, 4,122,934 acres; 33 presidentially endorsed areas, 2,669,180 acres; and 35 further study areas, 1,236,580 acres. Appendix A contains a summary of the status of wilderness and wilderness study areas in Montana.

Supply and Demand Factors

The National Wilderness Preservation System contains 50 of the 241 basic ecosystems recognized by the Bailey-Kuchler classification system as existing in the United States and Puerto Rico. Sixty-two more ecosystems are represented in presidentially endorsed areas, and 78 additional systems are represented in further study areas. None of the areas that have received presidential endorsement or are under study are known to contain the remaining 51 ecosystems (Davis 1980; Kuchler 1964; USDA, FS 1976, 1978a, 1978b). In general, the existing wilderness system includes a relatively large number of examples of high elevation mountain ecosystems and alpine, subalpine, and glacial landscapes.

Both designated wilderness and undesignated, de facto wilderness areas contribute to the supply of primitive recreation opportunities. While the supply of congressionally designated wilderness has increased since passage of the Wilderness Act of 1964, the supply of de facto wilderness areas has been declining. While one factor in this decline is the conversion of de facto wilderness to designated wilderness, other factors are involved as well. An indication of the overall decrease in de facto wilderness areas is the loss of Forest Service trail mileage, chiefly to roads for resource extraction. A loss of more than one-third of the total mileage is documented for the period between 1946-1971 (Spencer et al. 1980). While other factors may be involved in this loss, it still indicates a decrease in supply of de facto wilderness opportunities.

The demand for recreation opportunities and the need to provide diverse, high quality recreation are factors in wilderness decisions, although by themselves they do not clearly indicate that wilderness is or is not needed. In general, primitive recreation has shown tremendous growth since the mid-1960s. Various surveys show that there was a threefold or fourfold increase in hiking and backpacking from the 1960s to the late 1970s. This growth apparently has leveled off since the late 1970s, but it is expected that there will be major growth in the 1980s in snow-based activity, day use, and family hiking and backpacking (Spencer et al. 1980).

When a large number of persons seek a wilderness experience, the opportunities for such an experience can decrease. It has been documented that this happened as early as 1971, when a study of three wilderness areas revealed that more than half of the hikers using the areas were dissatisfied with the opportunities for solitude (Stankey 1971). A recent survey of managers of existing wilderness areas found that crowding was perceived as a problem in 49% of those areas (Cole and Washburne 1981).

An additional factor in the demand for wilderness opportunities is the fact that existing wilderness use is concentrated in the summer, since most areas currently in the NWPS are best suited for summertime use. The system contains relatively few low elevation areas in which environmental conditions are not harsh in all seasons but summer.

While primitive recreation use has grown, the same can be said of potentially competing uses such as motorized recreation. For example, snowmobile registrations in Montana were increasing at an annual rate of about 15% in the late 1970s. The growth in both motorized and primitive recreation is reflected in an analysis of the relative need for additional opportunities in the Montana Fish, Wildlife, and Parks regions (MDF&G SCORP 1978). Region 3, which includes the area under study here, is listed as having the second highest relative need for additional nonmotorized trail opportunities and the highest relative need for additional cross-country ski and snowshoe trail opportunities. Region 3 also is listed as having high relative needs for additional motorized recreation opportunities; it is second in snowmobiling and four-wheel driving and third in motorcycling.

Wilderness in the Local Area

Two of the WSAs covered in this report are entirely within Madison County, five are in Beaverhead County, and one lies in both counties. Approximately 57,893 acres addressed in this study are in Beaverhead County; 36,335 acres are in Madison County.

In addition to the units addressed here, the two counties contain two designated wilderness areas, seven proposed wilderness areas, and four areas under further study. Table 2 shows the existing, proposed, and further study areas by county.

Federal lands make up a significant percentage of lands in the two-county area. Approximately 58% of the total land within Beaverhead County and 46% of the land in Madison County is managed by federal agencies. Slightly less than 10% of the land managed by the BLM in the two counties is involved in this study.

Table 3 shows the percentage of federal land in the two counties that is designated as wilderness or under wilderness study.

Consistency with Other Plans

The Federal Land Policy and Management Act (FLPMA) requires that BLM plans be as consistent with state and local plans as federal laws, policies, and regulations will allow. When the decision is made to recommend a WSA as suitable or nonsuitable for wilderness designation, the consistency of these recommendations with other federal, state, local and tribal plans will be considered. However, the BLM cannot base its wilderness recommendations solely on consistency with these plans.

All state agencies will be notified of BLM plans, and affected state agencies will be asked to document any inconsistencies. When the draft recommendations are released, parties that might be affected will be notified so that any inconsistencies with the specific recommendations may be surfaced.

TABLE 2

EXISTING AND PROPOSED WILDERNESS AREAS AND AREAS UNDER WILDERNESS STUDY

	Beaverhead County		Madison County	
Type	Name	Acres[1]	Name	Acres
Existing Wilderness Areas	Red Rock Lakes (FWS)	32,350	None	—
	Anaconda-Pintler (FS)	72,537		
Total	2 areas	104,887		
Proposed Areas[2]	East Pioneer (FS)	93,859	Taylor-Hilgard (FS with	
	West Big Hole	56,008	contiguous BLM)	148,663
	North Big Hole		Spanish Peaks (FS)	31,349
	(Anaconda-Pintler addition)	6,532	Bear Trap Canyon (BLM	
			and FS)	5,463
			Lionhead (FS)	13,905
Total	3 areas	156,399	4 areas	199,380
Further Study Areas[3]	Centennial Mountains (BLM)	30,030	Middle Mountain-Tobacco	
	Mt. Jefferson (FS)	4,600	Roots (FS with contiguous	
	Italian Peaks (FS)	12,996	BLM lands)	37,500
Total	3 areas	47,626	1 area	37,500

BLM = Bureau of Land Management; FS = Forest Service; FWS = Fish and Wildlife Service.

[1]Acreages shown are those in affected counties only.

[2]"Proposed Areas" may refer to areas that the administering agency has recommended for wilderness designation or to areas with presidential endorsement.

[3]"Further Study Areas" does not include any areas for which the administering agency has made a final recommendation to Congress.

TABLE 3
PERCENTAGE OF LANDS AFFECTED BY WILDERNESS OR WILDERNESS STUDY

Type	Beaverhead County[1]		Madison County[2]		Two-county Area	
	Percentage of Federal Lands	Percentage of Total County Area	Percentage of Federal Lands	Percentage of Total County Area	Percentage of Federal Lands	Percentage of Total County Area
Dillon Resource Area wilderness study areas	2.8	1.6	3.5	1.6	3.0	1.6
Designated wilderness	5.0	2.9	0	0	3.4	1.8
Proposed wilderness	7.5	4.4	19.0	8.8	11.4	6.1
Other further study areas	2.3	1.3	3.6	1.7	2.7	1.5

[1]Federally administered lands in Beaverhead County comprise about 2,080,000 acres of the 3,564,000 acre total county area.

[2]Federally administered lands in Madison County comprise about 1,050,000 acres of the 2,259,000 acre total county area.

Federal Agency Plans

Forest Service. Five of the areas considered in this study are contiguous to Beaverhead National Forest roadless areas that have been reviewed for wilderness potential. National forest lands contiguous to four of the BLM WSAs were reviewed in the 1978 Beaverhead National Forest land management plan. These national forest lands, which are in the Gravelly and Tendoy ranges, were not considered in the RARE II wilderness review process but were released from further consideration for wilderness designation after having been reviewed in the management plan.

In discussions between the BLM and the FS in February 1981, it was revealed that FS policy is not to consider previous wilderness decisions in the first generation forest plans. It was agreed that the BLM would include no contiguous FS lands in the scope of its study.

A cooperative agreement between the BLM and the FS covers mutual wilderness study concerns.

Air Force. During the issue identification stage of this study, a representative of the Air Force indicated that the Air Force program of low level training flights could be affected by wilderness designation. This concern is dealt with in the BLM's wilderness management policy, which directs the BLM to confer with military authorities where such flights may become a problem when land is being managed as wilderness. Since this issue relates to managing areas that have already been designated as wilderness and not to whether areas are suitable for wilderness designation, it will not be discussed further in this document.

State of Montana Plans

Blacktail Game Range. The Montana Department of Fish, Wildlife, and Parks (MDFWP) manages the Blacktail Game Range, which is contiguous to the East Fork of Blacktail Deer Creek WSA. Although there is no formal, approved plan, the department has a management program that emphasizes maintaining adequate forage and limiting human and vehicle disturbance. Management of adjacent federal lands is related to the success of the state's management program.

Natural Resources Council. A recently signed memorandum of understanding between the BLM, the FS, and the governor of Montana created the Natural Resources Council, which will serve as a clearinghouse for consultation on all natural resource issues. The specific recommendations resulting from this study will be evaluated for consistency by this group.

Local Plans

Beaverhead County. *The Beaverhead County Comprehensive Plan* (Beaverhead County Planning Board 1976), which was prepared in 1976 and adopted in 1977, specifically mentions a policy to "discourage all wilderness areas in Beaverhead County." This policy is in conflict with the directives of FLPMA and the BLM wilderness program policy. Under FLPMA, wilderness preservation is part of the BLM's multiple use mandate, and wilderness values are recognized as part of the spectrum of resource values and uses to be considered in the planning process. A blanket policy discouraging all wilderness preservation is not consistent with this mandate.

The basis of the Beaverhead County policy is the effect of wilderness on the local economy—primarily the livestock, timber, and minerals sectors. Other related goals and objectives are to diversify the local economy; to provide diversified, quality recreation; to increase recreation-related tourism; and to protect key fish and wildlife habitats as they contribute to the economy and livelihood of local outfitters.

The plan says on page 117 that growth in the recreation sector "must be integrated with, and not detrimental to, the production of livestock, timber, and minerals." In addition, the action plan calls for an exchange of information on future land uses between the county planning board, larger private companies, and state and federal agencies. This latter provision is consistent with FLPMA directives and the current wilderness study.

Although it is apparent that the BLM cannot completely resolve the inconsistency between this county's plan and the agency's legal mandate and program policy, the study has incorporated an analysis of economic effects of wilderness designation and nondesignation. Local economic concerns will be considered as a major factor in deriving recommendations from this analysis.

Madison County. *The Madison County Comprehensive Plan* (Menasco-McGuinn Assoc. 1973) contains some provisions that relate indirectly to this study. The plan recognizes agriculture and tourism-recreation as the two mainstays of the Madison County economy. Positive factors influencing recreation's contribution are the proximity to Yellowstone Park, the blue ribbon status of area trout streams, and "an abundance of scenic natural areas." Two of the areas listed as scenic natural areas are areas being considered in this study—Axolotl Lakes WSA and Ruby Mountains WSA.

Mining is mentioned as a potentially positive factor for county employment as the economic feasibility of mineral extraction improves. There appear to be no inconsistencies between the formal county plan and this study, as the study has incorporated the relevant factors.

SOCIOECONOMIC OVERVIEW

Demographic Information

The WSAs discussed in this report are all in Beaverhead and Madison counties. The preliminary 1980 census indicates a population of 8,204 for Beaverhead County and 5,437 for Madison County.

The area is generally rural. Approximate populations are 1.5 per square mile in both counties. Growth in the Beaverhead County population has been relatively slow, with an increase of 0.2% between 1970 and 1980. Madison County had a larger increase of 8.4%, which was still below Montana's average of 12.9%.

Nonfarm private employment accounts for 61.0% of total employment in Beaverhead County and 50.1% in Madison County. Overall, the largest sectors of the economy of Beaverhead County by numbers employed are retail trade, state and local government, services, and farm, in that order. In addition, Beaverhead County has fairly large transportation, wholesale trade, manufacturing, and federal government sectors. In Madison County the largest sectors of the economy are state and local government, farm, services, and retail trade, in that order.

The average age of the population is older than the national average of 30. This indicates a population that is growing older at a faster rate than the national population, which means the young people of the area are moving away in order to find jobs. It may also mean that some older people are moving into the area to retire.

Social Well-Being and Attitudes

Social well-being as measured by economic factors shows relatively low per capita income, community services, and housing quality. However, when a nonstructured survey was made in May 1979, the majority of those interviewed expressed little concern about these statistics. The majority felt that their social well-being and quality of life were satisfactory. A large majority liked the sparse population and the wide variety of outdoor activities available in the area (USDI, BLM 1979).

Attitudes toward wilderness were mixed. In Madison County approximately half of those asked felt there is now enough designated wilderness in their area. Of others questioned, most felt that the amount of wilderness in the area was too great. Some expressed a desire to have more wilderness in the area. The residents interviewed in Beaverhead County tended to be more opposed to wilderness designation than those questioned in Madison County. In general, local opinion appears not to favor additional wilderness designation.

The majority of residents interviewed in Beaverhead and Madison counties had a favorable opinion of livestock grazing in the area. Many felt that grazing should be favored because of its importance to the area.

The majority of respondents in both counties also favored increased mineral production and development. About 40% favored slower growth in minerals development with more safeguards regulating rehabilitation of mine sites.

In the opinion of those surveyed, water and wildlife resources appear to be in satisfactory condition. Some respondents did mention specific areas where wildlife numbers would be increased.

Attitudes in both counties appear to favor slow growth rather than rapid growth. A majority of people inter-

viewed in Beaverhead County felt that the current rate of growth was satisfactory.

Economic Conditions

Timber Management

Commercial stands of timber exist in the Ruby Mountains, Blacktail Mountains, East Fork of Blacktail Deer Creek, Bell-Limekiln Canyons, Farlin Creek, and Axolotl Lakes WSAs. Beaverhead County in 1980 had two sawmills, one at Wisdom that processed less than 3 mmbm (million board feet measure—an expression of yearly capacity) and one in Dillon in the 10 to 25 mmbm size class. There were six sawmills in Madison County, but all were in the smallest size class—less than 3 mmbm. Each county also had three post and pole operations.

A University of Montana study indicates that Beaverhead County mills received more than half of their timber from public lands (BLM and national forest) in 1976, while Madison County mills got more than half of their timber from private lands.

Large mills—those producing more than 10 million board feet (mmbf)—produced 96% of the lumber in Montana in 1976. An average gain or loss of about six jobs in the lumber industry occurs for every gain or loss of 1 mmbf in timber output (Johnson 1972).

Given the cyclical nature of the forest products industry, mill capacity and demand is normally at, or above, the timber supply level on a sustained yield basis. At the present time, mill capacity in western Montana is generally greater than production, due to the slowdown in the housing industry.

Timber resources in the area also contribute to domestic fuelwood supplies. The availability of the areas under study here for fuelwood supplies is not a significant issue, however, due to their small sizes, scattered locations and relative inaccessibility, and availability of other much larger tracts of forested public lands in the local area.

Recreation

Statistics on visitors to southwestern Montana indicate that 46% come from Montana and 54% from other states and Canada. The largest numbers of out-of-state visitors come from California, Idaho, Utah, Washington, and Oregon, in that order (Epple 1977). Therefore, this area is important as a regional center for tourism.

Recreation provides substantial income to the economies of Beaverhead and Madison counties. Proximity to Yellowstone National Park and the national reputation of the area for hunting and fishing contribute greatly to the recreation economy.

A survey of visitors to this area indicated that a majority (56%) were seeking a primitive or semi-primitive, undeveloped recreation experience. The use of undeveloped campsites results from a desire for privacy and solitude (Epple 1977).

There are 239 developed camping units in Beaverhead County and 226 units in Madison County. Opportunities for dispersed recreation are widespread in this part of Montana. The areas available are not generally designated as wilderness, but many are roadless. They are generally in the mountains in Beaverhead and Madison counties and in surrounding counties. Although roadless areas now in existence are being used, an estimate of the demand for such areas is not available.

The demand for recreation such as hunting and fishing exceeds supply in this area, but the demand is controlled because the MDFWP regulates the opportunity to harvest some species.

Vehicles are used primarily as transportation, generally they are not themselves used as a form of recreation. The demand for off-road vehicle areas is increasing but has not reached the level that it has in other parts of the country.

On the national level, a survey done by the Heritage Conservation and Recreation Service indicated that 48.1 million Americans engaged in backpacking. That number of people represents 28% of the population.

Future trends for recreational uses appear divergent. The demand for all forms of recreation will increase as the population increases. The popularity of backpacking and wilderness use increased in the 1970s, as did the popularity of off-road vehicle travel. If this trend continues, more conflicting recreation demands will be made on the public lands.

Geology and Minerals

Information necessary to calculate the value of minerals is not available for the WSAs discussed in this report. Whether and when a mineral deposit is developed depends upon many factors: the price of the commodity, the cost of extraction, the ready availability of processing, the demand for the commodity (to some extent reflected in price), and other developments in the area. Supply and demand for each commodity that could be developed are analyzed so that the possibilities of development can be gauged. This method is based on the assumption that the grade of the ore and the size of the deposit are sufficient to make development profitable. This assumption may or may not reflect the actual case.

Mineral deposits are classified as leasable, locatable, or salable. Leasable deposits include oil and gas, coal, geothermal energy, and phosphate. Locatable minerals are metals, such as gold and silver, and other minerals for industrial use like talc and limestone. Examples of salable minerals are gravel and building stone. The minerals discussed below have at least some potential for occurrence in the local area.

Locatable Minerals. The demand for gold has lessened in recent months because the price dropped to around $400 per ounce. This drop has slowed development of new mines for the present. A sustained increase in gold prices could again increase interest in finding and developing new sources of supply. Based on mining and milling cost estimates, for underground operations, ranging from as low as $40/ton, under nearly ideal conditions, to $200/ton, minimum grades of between .2 oz/ton to .83 oz/ton of gold would be needed for a viable gold operation to take place in this area (Cumins and Given 1973 and USDA, FS 1980b). A surface mining operation could operate at a profit with ore grades significantly less than this.

The price of silver has declined from a high of $50 per troy ounce in January 1980 to the present $9 per troy ounce. While the price was high, money was used to open new mines and to work existing mines. Prices were high long enough that the demand began to decline as other materials were substituted for silver. Incentives for development are now low; however, this could change at any time, particularly during periods of political or financial unrest, because markets for precious metals are volatile. Interest in exploration for gold and silver can be expected to remain high even when prices are low.

The world market for copper has been soft in recent years. World production has exceeded current demand—a surplus of 150,000 metric tons is expected in 1981. Given the current oversupply, high interest rates, and slack demand, it is likely that future increases in demand will be met first by expansion to existing capacity rather than development of new, major open pit mines as was common in the last decade (Mining Engineering 1981.).

Lead is used primarily for lead acid batteries, with lesser amounts going to paint additives and gasoline additives. With the slowdown in the auto industry, the demand for lead has declined. Estimates for 1980 show that lead supplies produced in the United States will equal this country's demand for lead. Growth is expected in the lead industry as demand for lead acid batteries increases. Pressure for development of new resources of lead in the United States will probably not increase soon. Long-term prospects depend on innovations such as the development of electric vehicles.

With the present slump in the auto and construction industries, the demand for zinc decreased in 1980. Inventory stocks of zinc being held by industry have been dropping; the market is not expected to improve until the economy improves. An increase in demand could result in a shorter supply and higher prices; however, present mining operations appear adequate to provide sufficient supplies for the near future.

The demand for nickel was slow in 1980. Industry was reducing inventory rather than buying new supplies, and some producers were discounting prices. The demand for nickel could increase when the economy improves, because industry inventories are now depleted. Production of nickel in the United States is small; for strategic reasons nickel deposits in this country could be important. At this time it is more economical to import nickel. Most of our imports are from Canada.

The demand for iron has been slack because of the auto industry slumps and shifts to smaller and lighter cars. Demand can be expected to recover somewhat within the next two years. The small size of deposits and the traditional western problem of distance from markets means that development of iron resources in the near future is unlikely.

Prices for uranium are declining and demand is weak in this industry because of large supplies and production. The price of uranium dropped 35% between December 1979 and December 1980. At a price of $27 per pound, uranium in this area is not likely to be mined soon. At present, production is outpacing consumption at a rate of about two to one.

Vanadium is used in producing steel alloys with a high strength to weight ratio. Western world production capacity in 1980 exceeded usage by 26 million pounds. In addition, the Federal Emergency Management Agency is proposing to reduce the strategic stockpile by almost 8 million pounds. The demand for vanadium would increase if steel production increased.

There have been no chemical analyses for silicon dioxide (SiO_2) in this area. There is some potential for parts of the Quadrant quartzite to be used as glass sand. Any potential for silica within the Quadrant Formation in any WSA would be speculative.

Because housing markets are depressed, the production and demand for gypsum is down. Twenty-two states now produce gypsum, and given the depressed housing and construction industries, any increase in demand will likely be met by expanding production at existing facilities.

The demand for talc declined approximately 20% in 1980. Much of this decline is due to the general recession. This demand can be expected to rebound somewhat as the economy recovers. Additionally, new export markets may be developed that will take up the slack left by falling demand in the United States.

National production of talc in 1980 was approximately 1,300,000 short tons. Montana was the second largest producer of talc in the United States in 1980, producing 312,000 short tons valued at 11.3 million dollars. The national reserve base as determined by the U.S. Bureau of Mines is 150,000,000 tons (USDI, BM 1981). The producing talc mines in the state are all in Beaverhead and Madison counties. The presence of these facilities increases the likelihood of development of other depos-

its in the area as demand increases or as currently used deposits become exhausted.

Leasable Minerals. There is considerable interest in the oil and gas potential for the study area, since it is within the Overthrust Belt. The demand for oil and gas is high and obviously will continue.

Oil shale in the United States contains staggering reserves of oil; however, at the present level of technology only the richest deposits approach being economically recoverable. There is little likelihood that there will be any interest in low grade oil shales in the future. Some oil shales contain anomalously high metal values; this could improve their development potential.

Western states produce 10% of the nation's phosphate. The national demand for phosphates probably will continue to increase at 4 to 6% per year as new export markets develop; however, the regional demand for phosphate declined slightly in 1980. Western phosphate producers delivered 13% less phosphate in 1980 than in 1979. Existing deposits in southeastern Idaho will continue to supply most of the West's needs for some time. As production declines in Idaho, western production may shift to accessible deposits in southwestern Montana.

Carbon dioxide is used by the oil industry for injection into older oil wells to improve the recovery of oil. Geologic structures in southwestern Montana tend to favor the presence of carbon dioxide; however, development in other areas would tend to reduce the chances of carbon dioxide being developed here. Carbon dioxide at high pressure is known to be present in the Cut Bank, Montana, area, and many of the same rock units occur throughout southwest Montana. However, the need for and location of any carbon dioxide resource in southwest Montana is uncertain.

There is little active interest in geothermal resources in western Montana. Current geothermal activity in the western United States generally centers on younger acidic volcanic terrain, predominantly in Nevada, California, and Oregon. While much of southwestern Montana may have above average heat flows, at present technology levels any development of geothermal resources away from population centers in southwestern Montana is unlikely.

Salable Materials. Limited amounts of some salable minerals (building stone, sand and gravel) occur in some of the WSAs discussed in this report; however, the demand for such materials can easily be met by more accessible deposits.

Livestock Grazing

Two grazing associations and 31 individual operators currently use parts of the WSAs. Eight currently leased allotments are totally within a WSA; 25 more are partially within a WSA. The number of animal unit months (AUMs) permitted within WSAs ranges from a low of 4 to a high of 1,139.

Improvements planned for allotments that are completely or partially within WSAs range from none to extensive development of springs, wells, pipelines, stock tanks, fences, cattleguards, one reservoir, and prescribed burning in three areas.

Management of allotments is divided into those with allotment management plans (AMPs), which are intensively managed, and those without AMPs, which are less intensively managed. Those with AMPs have various grazing systems: rest-rotation, deferred grazing, deferred rotation, or alternate rest systems. Appendix B describes the various grazing systems.

Designation of an area as wilderness could have an effect on the manageability of those allotments or parts of allotments now in a WSA. In addition, some of the range projects designed to improve the range resource might have to be altered or eliminated in those areas. Therefore, some of the potential of the range could be lost. Use in these areas takes place in the late spring, summer, fall, and early winter. Grazing periods range from 15 days to almost six months in these allotments.

Most ranch operations require some borrowing of operating capital. In practice a BLM grazing permit has value for borrowing money and adding value to the base property at the time of sale. This permit value could be affected by changes in the status of land uses such as wilderness designation.

AIR QUALITY

All eight WSAs were classified as class II air quality by the Clean Air Act amendments of 1977. It is BLM policy that the agency will not recommend any change in air quality classification as part of its wilderness study process, and future wilderness designation does not carry with it mandatory reclassification to class I air quality.

It is the state, not the BLM, that has the authority to reclassify air quality, whether or not the BLM has made any recommendation as to air quality classification. The state has the prerogative to reclassify any area to class I if it so desires. The reclassification process must include a study of health, environmental, economic, social, and energy effects. Public hearings and a report to the U.S. Environmental Protection Agency (EPA), as outlined in section 164(a) of the Clean Air Act amendments of 1977, are also required.

Section 164(a) of the Clean Air Act, as amended, says that a national wilderness area of more than 10,000 acres may be reclassified only as class I or class II if it was established after the date of the act (August 7, 1977). Therefore, wilderness areas designated in the

future can either remain as class II or be reclassified as class I.

Class I air quality limitations are stringent, allowing very little deterioration. This designation is applied to areas where practically any change in air quality would be detrimental to air quality related values, including visibility. Very little, if any, industrial and population growth would be accommodated in a class I area. Class II limitations allow for moderate deterioration associated with moderate, well-controlled industrial and population growth. A proposed pollution source will be evaluated by a computer model (called an atmospheric dispersion model) to predict the distribution through space of emissions from the proposed source. The determination will be made whether the source would or would not meet the air quality limitations of the areas it would influence.

In summary, class I air quality reclassification does not accompany future wilderness legislation.

THREATENED AND ENDANGERED PLANTS AND ANIMALS

Plants

There are no officially recognized threatened or endangered plant species in the resource area; however, four plant species have been identified as potentially threatened or endangered in Montana on the basis of an unpublished study conducted in 1976 for the Forest Service by T. J. Watson, Jr., an assistant professor of botany from the University of Montana (Watson 1976). None of these species has been found in the eight areas under study here.

Animals

Bald eagles, an endangered species, are fairly common in the larger river drainages of the resource area during winter months. An estimated 20 to 30 baid eagles normally winter on the Beaverhead, Madison, and Big Hole rivers. Transient eagles may use some of the WSAs occasionally, but there are no resident populations in any WSA.

Although peregrine falcons have not been observed in any WSA, there is suitable unoccupied habitat for them in the Ruby Mountains and Blacktail Mountains WSAs.

Reports of the endangered northern Rocky Mountain wolf have been concentrated largely around the Tendoy Mountains and along the Continental Divide between Lemhi Pass and Monida Pass. Roughly 35 fall-winter observations of varying reliability (tracks, scat, sightings) have been recorded in this vicinity within the last ten years; about 20 observations have been reported throughout the entire resource area.

Intensive investigations were made in the vicinity of the Tendoy Mountains and Horse Prairie in the winter of 1979-1980, but no evidence of wolf use was found. (The Hidden Pasture Creek and Bell-Limekiln WSAs are near the area of the investigation.) After the investigation, it was concluded that the Tendoy Mountains area was suitable unoccupied habitat for wolf.

WATERSHED

Only limited data are available on the quantity and quality of surface water in the WSAs described here. Appendix F shows the surface water characteristics of each WSA. Water quality is believed to be generally good to excellent in the WSAs that contain surface water. The only significant nonpoint source pollutant (a pollutant that occurs in more than one place) is fecal contamination from livestock and wildlife. Suspended sediment may be a problem in some streams. This may be a result of livestock grazing practices, mineral activity, geologic influences, or some combination of the above.

An assessment by the state of Montana indicates that groundwater quality in western Montana is generally good. Only limited specific information is available on the groundwater for each WSA.

Generally, groundwater has not been developed in the Precambrian and Paleozoic rocks common in these WSAs, but small to moderate quantities of good quality water should be available. Few wells have been drilled in the Mesozoic rocks; however, those that exist are thought to contain small to moderate quantities of good quality water.

Appendix F discusses the soil associations found in each WSA and describes their major characteristics.

CULTURAL RESOURCES

Cultural resource inventories for the Dillon Resource Area MFP and environmental analyses for project implementation have provided significant information on the prehistoric and historic usage of lands within the Dillon Resource Area. Variable amounts of inventory have been accomplished for the wilderness study areas themselves, but the functional attributes of cultural resources within the areas can be expected to mirror those outside the areas in similar environmental, geological, and topographical settings. Appendix G summarizes the known occurrence of prehistoric and historic sites, inventory status and known cultural resource values within each wilderness study area.

ANALYSIS OF INDIVIDUAL WILDERNESS STUDY AREAS

BACKGROUND

The various resources in each WSA are discussed in the sections that follow. Legal descriptions of the lands in each WSA are found in Appendix D.

Wilderness

The section on wilderness for each WSA analyzes the area's wilderness quality, including naturalness, outstanding opportunities, and special features. The configuration (shape) of each area is considered. Configuration is important because opportunities for solitude and for travel in a natural setting are more likely to be present in a WSA that has a "block," or roughly rectangular, shape than in a long narrow strip where outside sights and sounds might intrude. Also discussed in the wilderness sections are the ecosystems represented in each area, its manageability as a wilderness unit, and the opportunities and objectives for each area.

Recreation

Sections on recreation discuss the existing recreation opportunities and use, both motorized and nonmotorized, that are available in each WSA.

Visual Resources

Scenic quality ratings and Visual Resource Management (VRM) classes are shown on the Visual Resources map for each WSA. The quality rating system employs three categories: Class A, outstanding scenic values; Class B, above average scenic values; and Class C, average scenic values.

VRM classes are established by first defining the cumulative effect of scenic quality and two other factors, the sensitivity of user groups toward maintenance of visual resources and the degree to which the landscape can be seen from major viewing routes and key observation points. Then VRM classes are established through multiple use analysis and the decision-making process.

The classification system ranges from Class I for special areas such as designated wilderness and wild and scenic rivers to Class V for areas where substantial rehabilitative measures are needed to qualify an area for one of the four higher classifications. Class V also is used as an interim class until an area can reach the objectives of another class.

Various management objectives must be met in each VRM class for scenic values to be maintained. These management objectives vary from Class I, where only natural ecological changes and very limited management activities are allowed, to Class IV, where visual impacts from management activities can be a dominant feature of the landscape.

Further information on the VRM system can be found in a BLM publication, *Visual Resources Management Program* (USDI, BLM 1980b).

Geology and Minerals

The Geology and Minerals sections summarize available information on the geology and the mineral potential of each WSA. These sections are condensed from more detailed reports on file at BLM offices in Butte and Dillon, Montana. Most of the information in these reports was abstracted from Dillon MFP data and other available reference material.

Information on each WSA was solicited from industry, local residents, mining claimants, universities, government agencies, mining societies, and other sources. Much of the information generated was quite general and often did not identify an area's potential for specific mineral commodities.

The geology and minerals sections of this document were prepared without field checking and should be considered preliminary. For each WSA recommended as suitable for wilderness designation in this study, a detailed Geological Survey/Bureau of Mines mineral report will be prepared and considered before the Secretary of the Interior makes a final recommendation on designation or nondesignation as wilderness.

Because southwestern Montana lies in the now famous Overthrust Belt, there has been considerable interest in the area's potential for oil and gas.

Livestock Grazing

All data on allotments are taken from the Mountain Foothills Grazing EIS. All acreages and AUMs are for the BLM-administered portions of the allotments only. AUM figures are based on surveyed grazing capacity.

Timber Management

The Timber Management sections analyze each unit's potential for timber production.

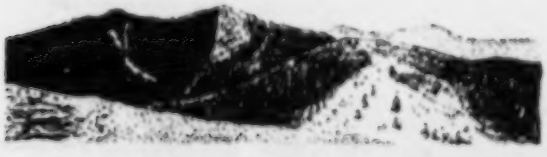
BLM specialists discussed the areas with the local timber industry and evaluated operability, access, and the possibility of commercial production. Past information from extensive inventories was analyzed for productivity figures and acreages by strata (grouping by tree height and crown density).

In evaluating timbered lands for their value for production of forest products, foresters must first determine which lands can be used for timber production without irreversible damage to the environment. In this analysis, areas steeper than 70% were automatically dropped from the productive base as too steep. Areas with slopes between 40% and 70% were considered potential cable logging areas. Slopes of less than 40% are operable with track and wheeled machinery.

After areas were classified by percentage of slope, the remaining base acreages were further reduced by isolated stand locations, damageable sites, soil restrictions, problems of regeneration, and economic considerations.

The basic unit of analysis for timber resources is the economic analysis unit (EAU). The EAU is an area served by a network of vehicle ways with a single point of entry into the study area. EAUs are discussed further in Appendix C, where the method of calculating the timber values is also explained.

RUBY MOUNTAINS WSA (MT-076-001)



The Ruby Mountains WSA contains 26,611 acres of BLM-administered land. Within the WSA boundaries are about 996 acres of private land and one state inholding of 640 acres. The unit is 15 miles east of Dillon and 2 miles west of Alder, Montana. It is bordered by legal boundaries of state, private, and other BLM lands not included in the WSA, except that a section of the southwest boundary less than 1 mile long is formed by a ridge. There is no legally established public access to reach the WSA. Some private access roads are not now posted, but that condition could change.

The unit is roughly rectangular on a southwest-northeast axis. Its width narrows to 1.5 miles in the south central portion because a finger of private land along McHessor Creek extends into the roughly rectangular area. There are three inholdings near the southeast boundary and one near the center of the unit.

The dominant topographic feature is the main north-south Ruby Range ridgeline, which forms the backbone of the Ruby Mountains. The north end of the range is drained by approximately 20 major and minor canyons. There are a few springs, but otherwise no water flows through these canyons except during snowmelt.

The south end of the unit, in the Garden Creek-Hinch Creek area, is well dissected but less precipitous than the northern section. Aspen and streamside meadows are common. Garden and Hinch Creeks are small spring-fed streams. Exposed, open ridges, timbered bottoms, and slopes protected from the elements are characteristic of this southern area.

About 80% of the WSA is forested; the greatest concentration of forested terrain is in the northern half. Douglas-fir, lodgepole pine, limber pine, and Engelmann spruce are the predominant species. Rock outcrops, talus, and open grassland are found in the 20% that is not forested.

Wilderness

Quality of the Wilderness Resource

Naturalness. Table 4 details the human imprints in this WSA. Among other relatively minor imprints are 4.5 miles of fence and 17.5 miles of vehicle ways. (See the Ruby WSA Developments and Allotments map.)

A number of these imprints—all of the fencing, 6 miles of vehicle ways, about 1.5 miles of the stock driveway, one partially logged area, and the line shack and corral—are in the south central part of the WSA, roughly between Garden Creek and Hinch Creek. Most of the other human imprints are dead-end vehicle ways that extend short distances up some of the canyons. None of these extends farther than 1.5 miles into the unit, and none shows evidence of regular use except the lower (eastern) end of the Laurin Canyon way.

The most substantial impact on naturalness in the WSA is the stock driveway extending from the south central part of the unit to the western boundary. Much of the driveway has been constructed with substantial cuts and fills. The part of the driveway near Big Dry Creek is in timber; therefore, it is less noticeable than the parts along open slopes south of Ruby Peak.

The bench cuts on the face of a cliff in Spring Canyon have a low to moderate impact.

Most of the north end of the unit (roughly 12,640 acres) is not used for livestock grazing; therefore, the natural composition of vegetation is not affected.

Outstanding Opportunities. The size, diversity, and challenging terrain of the WSA afford excellent opportunities for both daytime use and trips of several days' duration among the canyons, peaks, and other points of interest.

TABLE 4
EFFECTS ON NATURALNESS
RUBY MOUNTAINS WILDERNESS STUDY AREA (NV-076-001)

Feature	Legal Location	Location within Unit	Length/ Area	Overall Impact	Remarks
Fence #1	T7S, R5W, Sec. 6	Divide between Trout Creek and Garden Creek	1.0 mile	Very low	Through timber.
Fence #2	T6S, R5W, Secs. 20, 21, 28, and 32	Garden Creek-Hinch Creek	3.5 miles	Moderate	Mostly through open county, not skylined. Blends into grass foothills. Includes corral at Hinch Creek campsite.
Vehicle Way I	T6S, R5W, Sec. 32; T7S, R5W, Secs. 4 and 5	Garden Creek	2.5 miles	Low	Up creek bottom, many places undefinable. Some creek crossings have stumps and ruts.
Vehicle Way II	T6S, R6W, Secs. 28 and 34	Hinch Creek	2.0 miles	Low	Mostly through timber in Sec. 28. Some trees removed in this section. Parts of Sec. 34 appear more used, but visible only along creek.
Vehicle Way III (system)	T6S, R5W, Secs. 29, 30, and 32	Divide between McHessor Creek and Garden Creek	2.0 miles	Very low	Very light impact - three sections of way; two are 1/4 mile long or less.
Vehicle Way IV	T6S, R5W, Secs. 32 and 33; T7S, R5W, Secs. 4 and 5	Garden Creek; Wanwhoop Spring	1.5 miles	Low	Somewhat visible from divide between Hinch and Garden creeks, but low physical impact except in drainage bottom Sec. 5.
Vehicle Way V	T5S, R5W, Secs. 31 and 32	Spring Canyon	1.5 miles	Low	Two-wheel track. Access to mine workings and spring.
Vehicle Way VI	T6S, R5W, Secs. 10, 11 and 12	Laurin Canyon, Porter Canyon, and prairie to east	3.5 miles	Moderate	Most of mileage is on prairie in Sec. 12. Fairly well used. Also evidence of some use in lower part of Laurin Canyon, some apparently associated with livestock operation. Little use above forks in Sec. 10. SW1/4NE1/4.
Vehicle Way VII	T6S, R6W, Secs. 23, 26, and 35	Trout Creek	1.0 mile	Low	Two wheel tracks, light impact.
Vehicle Way VIII	T6S, R5W, Sec. 24	Taylor Canyon	1.0 mile	Low	Two wheel tracks, light impact.
Vehicle Way IX	T6S, R5W, Sec. 29	Drainage north of Spring Canyon, north edge of WSA	0.5 mile	Low	Two wheel tracks, light impact.
Vehicle Way X	T6S, R5W, Sec. 6	Drainage north of Big Dry Creek, west edge of WSA	1.0 mile	Low	Two wheel tracks, light impact.
Vehicle Way XI	T6S, R5W, Secs. 6 and 7	Big Dry Creek, west edge of WSA	1.0 mile	Low	Includes small corral along vehicle way.
Stock driveway	T6S, R5W, Secs. 7, 17, 18, 20, and 28	Hinch Creek ridge to Big Dry Creek - southeast to west central part of WSA	5.5 miles	Moderate to high	Cut and fill construction over all but 1 mile; generally not passable for vehicles. About 1 mile south and west of Ruby Peak and 1/2 mile in Sec. 28 are cut into open hillside and visible from parts of open ridges in south central part of unit. Also visible from Ruby Peak.
Spring #1	T6S, R5W, Sec. 21	Upper Hinch Creek	Less than 1.0 acre	Low	Spring is in crease in steep, well-dissected, open country.
Spring #2	T6S, R5W, Sec. 6	Northern tributary of Big Dry Creek	Less than 1.0 acre	Low	Spring box, trough in open drainage bottom.
Material removal area	T3S, R5W, Sec. 32	Spring Canyon	Less than 5.0 acres	Low to Moderate	Mainly a few bench cuts in a large cliff face.
Logging evidence	T7S, R5W, Secs. 5 and 6	South of Garden Creek	Near junction of Garden Cr. and tributary. Scattered high grading over 100 acres.	Low	High grade, scattered stumps. Evidence of old sawmill; large sawdust pile across creek from line shack.
Logging evidence	T6S, R5W, Secs. 9 and 10	Laurin Canyon	Scattered logging evidence over more than 100 acres.	Low to Moderate	Stumps in several drainages and on benches - mostly scattered, but occasionally several in view at once.
Line shack	T7S, R5W, Sec. 5	Garden Creek, edge of unit	1.0 acre	Moderate	Aluminum-sided shack and pole corral next to old sawmill site off Vehicle Way I.
Cabin remains	T6S, R6W, Sec. 26	On Trout Creek, less than 1/4 mile inside boundary		Low	Historic structure?
Cabin remains	T6S, R6W, Sec. 13	On McHessor Creek tributary, 1/8 mile inside boundary		Low	Historic structure?

The topography contributes to outstanding opportunities for solitude. The terrain in 95% of the unit is steep and dissected; the remaining five percent is moderately rolling. The rolling terrain is in the lower prairie and along some of the rather rounded ridges.

The core-to-perimeter air distance of the unit is just over two miles, but the rough topography makes the actual travel distance more than 4 miles. Elevations vary from about 5,320 feet on the prairie at the east edge of the unit to 9,391 feet on Ruby Peak. The elevation of more than half the unit is above 8,000 feet.

While most of the unit is steep and rugged, there are complete barriers to foot travel in only a few areas. The number of canyons and the feasibility of travel within the unit would act to disperse visitors.

There are distant views of the Ruby and Beaverhead valleys from the higher peaks and some of the open ridgelines. These views have an insignificant effect on solitude. The Cottonwood Creek haul road is visible from the Mormon Peak ridge (8,500 feet high) at the extreme south end of the unit, and sounds of the Tri-State strip mine occasionally are evident from that area. However, the ridge effectively screens the sights and sounds of the mine from the rest of the unit. Some blasting noise may penetrate a short distance beyond this ridge. Overall, the external influence of the mine is not significant north of the Mormon Peak ridge.

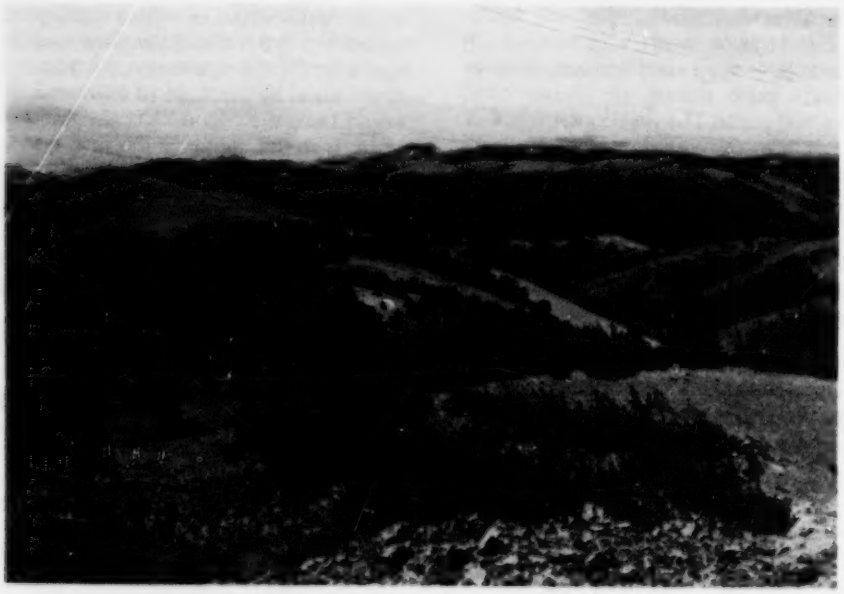
The opportunities for diverse types of primitive recreation are excellent. Visitors can hike, backpack, or ride horseback in spring, summer, and fall. The opportunities are excellent for winter recreation, including hiking in the lower elevations and skiing and snowshoeing in the high country.

The unit's diverse terrain provides opportunities for scenic backcountry travel. The southern and central parts of the unit provide the best terrain for horseback riding. Challenging hiking is the only possible mode of travel in the rugged terrain of the forested northern part of the unit.

Opportunities for hunting mule deer, and grouse are outstanding, and big game hunting is the primary recreation use at this time.

Special Features. A number of geologic and associated scenic features are present in the Ruby Mountains WSA. Free-standing rock walls, caves, and cliff faces add to scenic interest. The complex geology of the Ruby Range is a supplemental feature of interest.

As many as 13 different mountain ranges can be seen from high peaks and ridges in the unit. The scenic



Hinch Creek drainage from near Ruby Peak.

quality and variety of the WSA is high, with steep canyons, cliffs, timbered slopes, ridgetop parks, and sagebrush-grassland slopes and meadows.

Cultural resource values are considered significant. Occupation sites, ceremonial sites, and hunting blinds have been recorded.

The diverse habitats of the WSA provide yearlong or spring-summer-fall habitat for a variety of wildlife, including elk, which calve in this area, and mule deer. Habitat for mule deer is considered superior. A total of 12,640 acres within the WSA was designated by the Dillon MFP as wildlife habitat where no domestic livestock grazing is permitted.

Summary of Wilderness Quality. The pristine character of the core area of the WSA, its diversity and rugged topography, and its excellent vegetative screening contribute to the high quality wilderness characteristics of the unit. Its relatively large size, overall good configuration, and diverse special features are added benefits.

Impacts to wilderness quality in the unit include poor configuration in the south and a concentration of human imprints in the south central part.

Ecosystem Representation

Most of the WSA lies in the Douglas-fir ecosystem; however, part of the unit's conifer forest is a subtype not covered by the Douglas-fir type system described by Baily and Kuchler (Kuchler 1964; USDA, FS 1976, 1978a, 1978b). This subtype, which occurs on high elevation ridges and upper slopes of the range, consists of extensive, nearly pure stands of limber pine interspersed with small parks. The unit contains about 2,500 acres of this subtype, which is more common to the central and southern Rockies.

Sagebrush steppe and foothills prairie types also are present in the unit. Appendix E describes the major ecotypes found in the Dillon Resource Area and lists the acreage of each ecotype in each WSA. Also see the Ruby WSA ecotypes map.

Manageability

The core of the Ruby Mountains WSA would be manageable as a wilderness unit. Steep terrain in most of the unit forms a barrier to cross-country vehicle travel.

Management as a wilderness could be more difficult in the southern part of the unit because of poor configuration in the southwest. Three inholdings of private land are in the southern part of the unit, and there is a state-owned section near the center. Problems in management could occur over nonconforming uses or access rights. The state inholding includes Ruby Peak and the upper portions of Laurin and Porier canyons.

There are no existing oil and gas leases, but applications for leases covering less than 20% of the area are pending.

Opportunities and Objectives

Improving Wilderness Quality. Most of the unit's vehicle ways would return to a natural-appearing condition if traffic was restricted.

The old timber harvest areas in Garden Creek and Laurin Canyon, which will remain somewhat noticeable for a long period, would eventually become less evident. Cabins and corrals could be removed, but they are near the edges of the unit and do not affect quality substantially.

Rehabilitation of the material removal area in Spring Canyon would require heavy machinery. The stock driveway is, over much of its length, a substantial imprint. Unless mechanical means of rehabilitation were used, the driveway would return to a relatively natural condition only over a very long period.

Boundary adjustments could be made that would eliminate some human imprints. One possible change would be redrawing the boundary along topographic lines and constructed features, leaving the south end, where human imprints are concentrated, outside the boundary. All or part of the stock driveway might also be excluded from the WSA in this manner.

Improving Manageability. Certain land tenure adjustments would eliminate manageability problems associated with inholdings. One possible adjustment would be BLM acquisition of Section 16, T6S, R5W, now owned by the state of Montana. This acquisition would have the highest priority because the section, which is in the center of the unit, contains significant physical features related to manageability and wilderness quality, including Ruby Peak and the heads of Laurin and Porier Canyons.

Acquisition of the other inholdings also would improve manageability because a topographically defined boundary would then be possible south of Hinch Creek in T6S, R5W, Section 27 and Section 33, W1/2. These lands are privately owned.

The patented mining claim in Sections 23 and 24, T6S, R5W, is within the 1/8 mile of the unit boundary; however, acquisition of this parcel would forestall problems of access up Taylor Canyon and bring the entire length of the canyon into the WSA.

Recreation

In terms of both quality and quantity, the WSA offers good to excellent opportunities for camping, hiking, sightseeing, backpacking, photography, and hunting for big game and upland game birds. It is estimated that there are 300 recreation visits to the area each year.

The dominant recreational use of the area is light to moderate hunting of elk and deer, generally involving the use of motorized vehicles. The incidence of all other activities is extremely light (Epple 1977; USDI, BLM 1978).

Aerial and ground surveys indicate that day visits are the primary type of visit for all forms of recreation in this WSA. Visitors generally park their vehicles immediately outside the boundary of the unit. This is primarily because the rugged terrain of most of the unit physically precludes the use of motorized vehicles.

Although the Dillon MFP prescribed travel restrictions in this area for the benefit of wildlife and recreation, the off-road vehicle (ORV) travel plan prepared for this area in 1981 did not implement such restrictions, pending further inventory to determine the type and degree of travel management required. The Ruby Developments and Allotments map shows the vehicle ways now in the unit. These represent most or all of the travel routes now usable by wheeled recreation vehicles.

Generally the south end of the Ruby Range is more suitable for vehicle travel than the north. Decisions in the Dillon MFP propose that several routes be provided for public access to the WSA, but that the WSA itself remain in a relatively primitive condition even if it is not designated wilderness.

Wildlife

The MDFWP has intensively studied elk in the Gravelly-Snowcrest range and the adjacent Ruby Range since 1957. They are described by Rouse (1957), Eustace (1967), Reichelt (1972), and MDFWP (1980).

There is diverse spring-summer-fall habitat for elk throughout this WSA, but winter range is mostly outside the unit. There is also important calving range within the WSA. Reichelt determined that the calving period for elk is from May 17 to June 4.

Mule deer are found at nearly all elevations within the unit, which provides superior habitat. The current deer population in the unit is high.

The WSA provides excellent habitat for blue grouse, ruffed grouse, and spruce grouse. Blue grouse are the most common mountain grouse species found here.

Geology and Minerals

Geologic Setting

The part of the Ruby Range included in the WSA contains about 5,000 feet of Paleozoic marine sedimentary rocks overlying a Precambrian metamorphic rock basement. Mesozoic rocks are represented only by several hundred feet of a nonmarine conglomerate, the Beaverhead Formation (USDI GS 1976). Tertiary rocks composed of mudstone, siltstone, and sandstone crop out along the margins of the range.

Quaternary deposits within the range consist of tufa, conglomerate, alluvium, colluvium, and glacial deposits. Small intrusive bodies of Tertiary-aged basalt, andesite, and rhyolite occur along some faults present in this part of the range (see the Geologic Map of the Northern Ruby Range).

The Precambrian metamorphic rocks outcropping in the southern portion of the WSA consist chiefly of hornblende and biotite gneisses, granitic gneiss, dolomitic marble, quartzo-feldspathic gneiss, and sillimanite schist. Iron formation, associated quartzite, and diopsidic gneiss outcrop in the southeastern portion.

The last metamorphic event in the Ruby Range took place about 1,600,000 years ago (Giletti 1966). The hardrock mineral potential that is available in the range originates from rocks and minerals of this age.

Rock Units

Tysdal (USDI, GS 1976) mapped the Paleozoic rocks of this region. He found that they make up most of the sedimentary sequence (about 5,000 feet) present in the Ruby Range. Ordovician, Silurian, and Permian rocks are not present. The mapped units include virtually the entire sequence of paleozoic rocks typical to southwest Montana.

The Beaverhead Formation (Upper Cretaceous to Lower Tertiary) is the only Mesozoic rock preserved in the range. This formation, which is made up of three types of conglomerate, is several hundred feet thick.

Geologic Structure

Isoclinal folding of the Precambrian rocks during two periods of intense folding has left a conspicuous, well-developed regional foliation in the rocks.

Faults of variable trends and ages are present, but their exposure is poor. A major high-angle northwest-trending fault system truncates against the northeast-trending faults.

Known Mineral Deposits

Locatable Minerals. Only two occurrences of locatable minerals have been reported in the area, neither on federal land. Berg (Mont. Bur. Mines & Geol. 1979) notes that talc chips were found on Ruby Peak in the W1/2 of Section 16, T6S, R5W, which is state-owned. There also are numerous talc mines and prospects in the Precambrian rocks immediately south of the WSA.

The Kelly Iron deposit outcrops in Sec. 25, T6S, R5W, which is private land. According to Wilson (1981), portions of this deposit may extend into the S1/2S1/2 of Section 24, T6S, R5W.

Data on the chemical and economic potential of the Kelly Iron Deposit are scarce. Wilson (1981) references

three chemical analyses of this iron formation. The total iron oxide percentage ($FeO + Fe_2O_3$) of these analyses ranged from 50.00% to 51.78%. According to Computerized Resource Information Base (CRIB), a system by which the Geological Survey categorizes mineral deposits, the grade of the deposit ranges from 20% to 35% Fe (USDI, GS 1981). It has been estimated that this magnetite-high deposit contains about 180,000 tons of 34% Fe. There are several similar low tonnage iron deposits in the Tobacco Root and Ruby ranges.

Leasable Minerals. Information on leasable materials in this WSA was taken from the Dillon MFP. The Geological Survey, U.S. Department of the Interior (GS) has said that a large part of this WSA is potentially valuable for oil and gas and for coal.

Mining Claims, Leases, and Permits

No mining claims have been reported to the BLM for any of these lands, and no mining has ever taken place. About 20% of the lands in the WSA are under applications for oil and gas leases but no leases have been issued to date (see the Ruby Mountains Mining Claims and Mineral Leases map). No sales permits have been issued by the BLM for mineral materials in this area. There was one free use permit, but it has expired.

Mineral Resource Potential

If the Kelly iron deposit is ever developed, it is certain that a portion of the WSA, Section 24, T6S, R5W, would be involved in the operation. Any iron deposits in the Ruby Range are likely to be small, in the 200,000-ton range.

Talc occurrences in the Precambrian metamorphic units are restricted to marble units. These are identified on the mineral potential map as having the highest potential; however, there are no known occurrences of ore grade talc within those areas. The remainder of the Precambrian metamorphic units have moderate potential for iron, kyanite, sillimanite, graphite and other metamorphic minerals.

Two of the largest talc mines in the West lie just outside the southwestern boundary of this WSA. One of the companies, Pfizer, Inc., feels that the land has a high potential for talc exploration.

It is difficult to estimate the area's oil and gas potential. The geology of the Ruby Range, Precambrian, is unfavorable for oil and gas. Much of the Ruby Range is less favorable for oil and gas than other ranges in southwestern Montana.

Livestock Grazing

The Ruby Mountains WSA contains parts of two grazing allotments for which AMPs are proposed and four custodial allotments. A total of 13,557 acres of this WSA are not leased for grazing.

AMP Allotments

The Garden Creek Allotment (0479) contains a total of 10,169 acres; 6,900 acres (68%) are inside the WSA boundaries. The total of AUMs is 857; 525 AUMs are within the WSA. Cattle graze in this allotment in July, August, and September on a deferred rotation system. It is projected that this allotment will have 1,003 AUMs by 2010 (USDI, BLM 1980a). There is about 5 miles of fence along the boundary between this allotment and the McHessor Creek Allotment. A stock driveway also is in the allotment, and its use will be reviewed under the Dillon MFP. In addition, the unit contains a line shack and a seasonal camp that are used by the permittees.

Improvements proposed for this allotment are one spring development and approximately 900 acres of prescribed burning. The primary purpose of the burn would be to achieve better distribution of livestock to reduce the impacts on riparian habitat, particularly in Garden and Hinch creeks. About a 90 AUM increase in grazing capacity would result, but considerably less than the full amount would likely be allocated to livestock.

Of the total area shown as proposed for burning on the Developments and Allotments map for Ruby, about half of the most suitable sites would be burned. The highest priority area for burning is that north of Garden Creek.

The McHessor Creek Allotment (0530) contains a total of 4,864 acres; 2,760 acres (57%) are inside the WSA boundaries. The total of AUMs is 132; 72 of these are within the WSA. Cattle graze this allotment in July, August, and September. The Mountain Foothills EIS projects that there will be 154 AUMs by 2010. Alternate rest, deferred rotation, and deferred grazing systems are proposed for different parts of this allotment.

There is approximately 5 miles of fence between this allotment and the Garden Creek allotment, as mentioned above.

One spring development inside the WSA is proposed for this allotment.

For each of these allotments, motorized equipment may be needed for construction of proposed developments and on an occassional basis for major maintenance and reconstruction of both proposed and existing improvements.

Custodial Allotments

The following custodial allotments are within the Ruby Mountains WSA:

Allotment Name and Number	Acreage		AUMs		Season of Use
	Inside WSA	Total	Inside WSA	Total AUMs	
Spring Canyon (0527)	530	530	38	38	7/15-10/1
Laurin Canyon (0463)	1,077	1,077	114	114	7/1-10/31
Pierce Canyon (0493)	605	605	23	23	6/1-7/31
Garden (0601)	1,147	1,147	66	66	5/15-11/1

Timber Management

The WSA contains approximately 17,500 acres of forestland. Of this, 6,287 acres (36%) are on slopes of more than 70%. The acreage on slopes suitable for cable yarding is 8,908 (51%). Only 2,271 acres (13%) of the harvestable timber is on land suitable for ground skidding.

The ruggedness of this range is one reason it has remained undeveloped. The entire north end of the range is considered inoperable for economic and/or topographic reasons. South slopes are dry and rocky with scattered stands of stunted Douglas-fir and juniper. Habitat types are often Douglas-fir/pine grass, Douglas-fir/bluebunch wheatgrass, or Douglas-fir/Idaho fescue. Regeneration after cutting in any of these would be difficult. Exposed ridges of bare rock are common; road development would be expensive.

The south end of the WSA, which contains the greatest percentage of operable ground, is evaluated in table 5. Appendix C describes the assumptions used in the BLM timber analysis.

TABLE 5
PRESENT NET WORTH OF TIMBER: RUBY MOUNTAINS WSA

	Economic Analysis Unit (EAU)			
	1	2	3	4
Present timber acreage[1]	526	999	617	1,368
Miles of road	4.6	5.1	3.9	8.2
At 4% discount rate				
Present value of timber	$65,617	$66,173	$42,908	$76,416
Road costs	124,862	154,893	73,315	54,954
Present net worth	-$59,245	-$88,720	-$30,407	+$21,462
At 7-3/8% discount rate				
Present value of timber	$17,674	$7,050	$3,052	-$2,252
Road costs	97,380	88,532	30,226	16,432
Present net worth	-$79,706	-$81,482	-$27,174	-$18,684

[1]After timber production capability class (TPCC) reductions (see Appendix C).

BLACKTAIL MOUNTAINS WSA (MT-076-002)

The 17,479-acre Blacktail Mountains WSA is approximately 12 miles south of Dillon, Montana. Roughly rectangular, it measures more than 11 miles long by 1 to 5 miles wide. There are no inholdings.

All boundaries are formed by the border between public and nonpublic land except on the west, where a road and a fence form a portion of the boundary. There is no legal public access to reach this area. Some private roads are not now posted, but that situation could change.

The WSA consists primarily of the summit of a high plateau that extends more than 11 miles in a northwest-southeast direction. Drainages leading north and northeast from the plateau are also in the WSA; many of them are deep, timbered canyons with dramatic cliffs and headwalls at the tops of the ridges. Spruce, Douglas-fir, and limber pine are the dominant tree species in these canyons. Roughly half the drainages are seasonally dry. The top part of the plateau is characterized by open, rolling topography and grassland-sagebrush communities.

Wilderness

Quality of the Wilderness Resource

Naturalness. This unit contains less than 8 miles of vehicle ways, about 3-1/2 miles of which are within 1/4 mile of the boundary. Most of the other imprints detailed in table 6 also are within 1/4 mile of the boundary. There is low to moderate impact in the bottom of Ashbough Canyon and in the bottom of the north fork of Jake Canyon where timber was harvested in the early part of this century.

Overall, the WSA is in a nearly pristine condition. A 3,880-acre area in the northwest part of the unit is not leased for domestic grazing.

TABLE 6
EFFECTS ON NATURALNESS
BLACKTAIL MOUNTAINS WILDERNESS STUDY AREA (MT-076-002)

Feature	Legal Location	Location within Unit	Length/ Area	Overall Impact	Remarks
Vehicle Way I	T10S, R8W, Secs. 4 and 8	Begins in southwest corner of unit and passes through west central portion	2.5 miles	Low	Very faint wheel tracks across open country.
Vehicle Way II	T10S, R8W, Sec. 14	Passes through a narrow finger of public land in the south central part of the WSA.	0.75 mile	Low	Two wheel tracks that become very faint in places.
Vehicle Way III	T10S, R8W, Sec. 14	Passes through a narrow finger of public land in the south central part of the WSA.	0.5 mile	Low	Two wheel tracks across a hillside - at one time it connected with Vehicle Way IV, but an old sidehill cut has filled in and it is impassable to vehicles.
Vehicle Way IV	T10S, R8W, Secs. 12 and 13	Passes through central part of unit on ridge above North Fork, Jake Canyon road.	1.0 mile	Moderate	Extension of North Fork, Jake Canyon road. Goes through timber with trees cut out and other minor construction. No maintenance, occasional use.
Vehicle Way V	T10S, R7W, Sec. 18	Runs up the bottom of Jake Canyon	1.0 mile	Low	Once constructed but shows no sign of recent use.
Vehicle Way VI	T10S, R7W, Secs. 17 and 21	Cuts across the corners of two sections on the southeast edge of the unit	1.0 mile	Low	Consists of two wheel tracks.
Vehicle Way VII	T10S, R7W, Sec. 27	Runs up the bottom of Cottonwood Creek in extreme southeast corner of unit	0.5 mile	Low	Essentially a two-wheel track that was once constructed through the forest.
Vehicle Way VIII	T10S, R7W, Sec. 17	Swings just into boundary of unit east of Silver Queen mine	Less than 0.25 mile	Low	Has been bladed, but its impact is low because only a small portion is in the unit.
Vehicle Way IX	T10S, R8W, Sec. 12	Runs up open slope near boundary on east side of unit	0.25 mile	Low	Because of its location, this way is visible from many areas, but this is mitigated by short length.
Spring development	T9S, R8W, Sec. 19	In timber in northwest corner of unit	Less than 1.0 acre	Low	Visible only in immediate vicinity, as it is in timber.
Reservoir	T10S, R8W, Sec. 6	Near west boundary of unit	Less than 3.0 acres	Low	In small basin within 1/4 mile of boundary.
Timber harvesting	T10S, R8W, Secs. 33 and 34	Bottom of Ashbough Canyon	80 acres*	Low to moderate	Harvesting was done many years ago. Evidence very obvious in some places; hardly noticeable at all in others.
Timber harvesting	T10S, R8W, Sec. 12; T10S, R7W, Sec. 7	Bottom of North Fork of Jake Canyon	20 acres	Low	Scattered stumps along bottom of creek.
Cabin site	T10S, R7W, Sec. 21	In drainage in southeast corner of the unit.	Less than 1.0 acre	Low	Stone foundation and chimney just inside boundary.
Cabin site	T10S, R7W, Sec. 17	In drainage in southeast part of unit.	Less than 1.0 acre	Low	Cabin, which is just inside boundary, is deteriorating.
Cabin site	T10S, R8W, Sec. 6	Near boundary on west edge of unit	Less than 1.0 acre	Low	Very deteriorated cabin is not very noticeable.
Prospect pits	T10S, R7W, Sec. 21	Near boundary on extreme southeast edge of unit	Less than 1.0 acre	Low	Consists of two shallow dozer scrapes that are now revegetating.
Prospect pits	T10S, R8W, Sec. 12	On slope above the North Fork of Jake Canyon	Less than 1.0 acre	Low	Two shallow dozer scrapes are now revegetating.

Looking towards Ashbough Peak from Blue Mountain.

Outstanding Opportunities. The area is roughly rectangular on a northwest-southeast axis, but it narrows and becomes irregular on the southeast end. This irregular boundary is caused by landownership patterns. The core-to-perimeter air distance is approximately 1-1/4 miles, but the actual travel distance is greater because of rough topography. Nonfederal lands that intrude into the boundary in several places cut off topographic routes of travel.

Topographic relief varies from about 6,200 feet at the mouth of Irishman's Hole to 9,477 feet at the top of an unnamed peak near the center of the unit. Terrain in 85% of the unit is steep and well dissected; the remaining 15%, mainly along the ridges, is rolling. All or parts of the headwaters of ten major drainages are in the WSA, and many smaller drainages also head within the unit.

The dominant feature of the unit is the high northwest-southeast trending ridge from which the deep drainages flow generally northeast. These deep drainages and their associated cliffs constitute moderate to severe barriers to foot and horseback travel. Since several of the canyons have running water most of the year, they would be the primary recreational attractions, along with the high, open, scenic ridgetop.

The WSA is roughly 60% forested; the remaining 40% is either rock outcrops, scree slopes, or grassland. Timber, which is mainly in the drainages, provides excellent screening in these areas.

Irrigated farmland and the town of Dillon are distantly visible from almost any high point in the unit, but these have only an insignificant impact on the opportunities for solitude. The Silver Queen Mine can be seen from a very small portion of the unit in Jake Canyon. If the mine were active, sounds would penetrate into the unit for a short distance.

In general, topography and vegetation combine to provide excellent screening throughout most of the unit. The numerous canyons help disperse visitors, and the lack of significant outside sights and sounds adds to the sense of isolation. All these factors contribute to the excellent opportunities for solitude in the unit.

The diversity of the WSA provides many opportunities for primitive and unconfined types of recreation. Backpacking, camping, and big game hunting are probably the major attractions, but the opportunities for day hiking, horseback riding, sightseeing, nature study, and rockhounding are also excellent. Opportunities for cross-country skiing and snowshoeing are good in winter. The steep slopes and cliffs of the drainages make

cross-country travel difficult and challenging. All these factors combine to provide high quality opportunities for primitive and unconfined recreation.

Special Features. The WSA provides important habitat for a variety of wildlife species, including mule deer, elk, and moose. There is some winter range for mule deer in Jake Canyon, and parts of the WSA have been identified as elk winter range and calving grounds. Elk and deer also use the WSA in spring, summer, and fall. There is also suitable, unoccupied bighorn sheep and peregrine falcon habitat in the WSA.

The complex folded and faulted geology of the area offers opportunities for study by amateur geologists. Cultural resources are moderatley significant.

The five peaks higher than 9,000 feet offer outstanding panoramic views, some of which exceed 80 miles on a clear day. Scenic quality and variety within the unit is outstanding, with cliffs and free-standing rock walls, timbered slopes, cirque basins, and rolling sub-alpine terrain.

Summary of Wilderness Quality. The overall quality of the area's wilderness characteristics is relatively high. Its generally undisturbed natural condition and the excellent opportunities for solitude and for primitive and unconfined types of recreation contribute to this high quality. Although manageability considerations reduce the quality somewhat, the degree of reduction is not large. Possible boundary adjustments would mitigate the impacts to some extent.

Ecosystem Representation

The WSA contains four major ecotypes: Douglas-fir forest, which occurs mainly on the northeast face of the prominent ridge and in the major drainage bottoms; sagebrush steppe and foothills prairie, which are generally near the top of the ridge and on the gentler southwest side; and small amounts of alpine meadows and barren. Most of the area in the foothills prairie ecosystem is physiographically distinguishable from the pure Bailey-Kuchler type, as it lies on the crest of the Blacktail Range, at an elevation of more than 9,000 feet, and includes some elements of the alpine type. See Appendix E and the Blacktail WSA Ecotypes map.

Manageability

None of the boundaries of the WSA corresponds to any readily identifiable topographic features that would aid in management of the area. Some boundaries are along identifiable constructed features such as roads and fences. Configuration in the southeast portion of the unit is relatively poor because "thumbs" of nonpublic land intrude into the boundaries. There are no nonpublic inholdings.

The steep terrain of the Blacktail Mountains effectively acts as a barrier to cross-county vehicle travel, although travel is possible along the open ridge on the south edge of the unit.

Although the entire WSA is leased for oil and gas, only a very small portion is covered by pre-FLPMA leases, which are not subject to stipulations that protect the area's wilderness character. There are no mining claims in the unit that have valid existing rights precluding wilderness protection measures.

Opportunities and Objectives

Improving Wilderness Quality. Vehicle ways I, II, III, VI, and IX would all revegetate to the point of being almost completely unnoticeable in only a short time if traffic on them was restricted. Vehicles ways IV, V, VII, and VIII, on which there was construction at some time in the past, would take somewhat longer to disappear completely. They are already substantially revegetated, but some of the dozer cuts are still visible and will remain so for some time.

Although the old timber harvesting areas will eventually become less noticeable, they will remain somewhat noticeable for a long period. The same is true of the cabin remains.

Improving Manageability. Land tenure adjustments in certain areas would eliminate intruding thumbs of nonpublic land and enhance the overall manageability of the area. For example, the E1/2, Section 10 and the W1/2, Section 11, T10S, R8W, which are owned by the state of Montana, are at the head of Riley Canyon and at the crest of the Blacktail Range.

The state-owned Section 32, T9S, R8W, and the privately owned NE1/4NW1/4 of Section 5, T10S, R8W, encompasses another part of the Blacktail Range crest and the head of Ashbough Canyon. BLM acquisition of these parcels would bring the entire ridge, which is a natural travel route, and the heads of two major canyons into the WSA. It also would make possible the use of recognizable natural and constructed features as boundaries.

Overall, the manageability of this WSA is affected somewhat because there are few opportunities to use physiographic boundaries, which are more recognizable on the ground than are legal subdivision boundaries.

Recreation

This WSA offers above-average to excellent opportunities for hunting of big game and upland game birds and for camping, hiking, backpacking, photography, and sightseeing. Current use is light to moderate, 550 recreation visits annually. The dominant use is big game hunting during the fall, some of which involves the use of motorized vehicles.

The use of motorized vehicles in the area is limited substantially by road closures on private land that borders the unit and by rough terrain over much of the area. Vehicle restrictions are in effect in the area to protect wildlife habitat. The Dillon MFP has proposed public access for recreation in Ashbough Canyon.

Wildlife

The Jake Canyon area in this WSA provides crucial winter range for 135 to 140 elk. About 200 to 250 elk inhabit the unit during spring, summer, and fall.

The WSA provides excellent spring-summer-fall range for mule deer. Winter range is limited primarily to the Jake Canyon area. The area, which is roadless for the most part, is ideal summer range for mule deer. The deer population of the Blacktail Mountains appears to be increasing, especially in the WSA.

Only an occasional moose is found in the unit; however, the area is potential moose habitat even though the population appears to be low. Bears are found in the unit, but the population is relatively small. There also is good habitat for mountain lions.

This area contains suitable unoccupied habitat for bighorn sheep and peregrine falcons; however, there are no plans at present for reintroducing either species.

Blue grouse and ruffed grouse are found in the unit, which provides yearlong habitat for mountain grouse and seasonal habitat for numerous nongame birds. Important habitat includes forested lands and Douglas-fir interspersed with nonforested sagebrush/grassland on open ridges.

Geology and Minerals

Reconnaissance studies have been done by Klepper (USDI, GS 1950) and by Scholten, Keenmon, and Kupsch (1955). Detailed geology in much of the Blacktail Mountains has been done by Pecora (1981).

Geologic Setting

This WSA lies along the crest of the Blacktail Mountains, which consist mainly of a structural dome with a core of highly metamorphosed Precambrian rocks dated at 2.76 billion years (James and Hedge 1980). Foliation in these highly metamorphosed rocks trends generally northeast and dips approximately 70 degrees northwest.

Lithologies include marble, metaquartzite, amphibolite, diabase, and quartzofeldspathic gneiss. Ultramafic rocks are less common. Paleozoic through quaternary sediments are present in the western end of the WSA. On the north, the Blacktail Mountains are defined by the Blacktail Fault, a range front fault separating the mountains from the downdropped Blacktail Deer Creek Basin; to the south, a series of smaller faults delineates the southern edge of the Blacktail Range.

The northwest end of the range consists of a paleozoic section of rocks that lie unconformably on Precambrian rocks. The main Precambrian core of the Blacktail Mountains has been faulted up; the overlying paleozoic sediments having been eroded away. It is possible the entire Blacktail Range is a large thrust sheet, although there is no substantive evidence for this.

Rock Units

Rocks varying in age from Precambrian through Tertiary are present either in or close to the WSA.

There are metasedimentary gneisses that may be pre-Cherry Creek-Pony series, but no detailed study of Precambrian lithologies has been made. In the Dillon granite gneiss along the Jake Creek drainage, there are occurrences of ultramafic rocks. Some nickel mineralization is associated with these ultramafic bodies.

Virtually the entire Paleozoic-Teritiary sequence of sedimentary rocks is present in or adjacent to the WSA.

Igneous rocks in this WSA are the pre-Cherry Creek gneisses and the Dillon granite gneiss, both of which include dikes, sills, and small bodies of pegmatite and aplite of undetermined age. Tertiary volcanic rocks include a variety of predominantly silicic rock types and intermediate flows and tuffs. Some of the flows are as young as early Miocene in age.

Geologic Structure

The Blacktail Range is bounded by the downdropped Blacktail Basin block to the north and a series of small faults paralleling the range to the south. The prominent structural element within the range is a series of low angle, north-trending thrust faults that dip to the west. North-trending overturned folds are associated with these thrusts (see the General Geologic map and the Generalized Geologic Structure Map).

Known Mineral Deposits

Locatable Minerals. The only metalliferous deposit that has been explored in any detail is the Silver Queen Mine in Section 17, T10S, R7W. The Silver Queen property involves several unpatented mining claims. Underground workings extend for several hundred feet. The original locations were made in 1904; some ore has been shipped to the Anaconda smelter as recently as 1973. The owners had applied for a patent in 1976 but withdrew their patent application in 1978.

The geology of the surrounding area is Dillon granite gneiss. To the southeast the geology changes to Precambrian pre-Cherry Creek rocks (see the Generalized Geologic Structure map). Mineralization occurs along a fault that trends generally northwest-southeast. Closely aligned with the fault system is a massive quartzite unit

approximately 200 feet thick that dips 20 degrees to 30 degrees to the northeast.

The silver mineralization is in the fault zone. This fault may be part of the range front fault system along the north edge of the Blacktail Range. Copper and gold also are present. Silver values range from a trace to more than 100 ounces per ton.

Gold values do not appear to be significant; they generally are less than 0.05 ounces per ton. Sample values taken in one of the drifts averaged approximately 1% copper along 50 feet of the drift. Silver and copper values are promising; however, there has been no drilling program to aid in developing tonnage estimates. From the available information it is impossible to make any generalization beyond the obvious: values that high clearly warrant additional exploration to determine if a profitable mine might be developed.

The Nevada mine in Section 21, T9S, R8W, is a similar occurrence along the range front fault. Recorded production is 567 tons of ore yielding 988 pounds of copper, 8,219 ounces of silver, and 7 ounces of gold. Production was during 1934 and 1935 (Mont. Bur. Mines & Geol. 1972). No additional information is available on this mine.

The Dillon (Wolf Creek) nickel deposit occurs along Jake Creek to the west of the Silver Queen. Nickel mineralization is associated with an ultramafic complex composed of peridotite (75% pyroxene, 25% olivine). The ultramafic complex occurs in the pre-Cherry Creek rocks. Some chromium may be associated with the nickel mineralization. Nickel occurs as an alteration product. The distribution of nickel is very irregular. Locally, values as high as 2% nickel have been reported. The lack of information apparently is due to the spotty and irregular nature of nickel mineralization and the generally low grade of nickel mineralization.

No other metalliferous deposits are known to occur in or adjacent to the WSA. The northwest part of the unit contains rock of Cambrian through Tertiary age. None of the sedimentary units except the Permian Phosphoria formation are noted for containing anomalous metal values.

The Phosphoria Formation contains both uranium and vanadium. The potential recovery of uranium or vanadium depends on the fortunes of western phosphate, because both uranium and vanadium are uneconomical at the present time.

Nonmetalliferous locatable minerals found in the area are barite and silica. Claims have been staked for barite in Sections 17 and 18, T9S, R8W, and some work has recently been done on one of these claims. Spectrographic analyses show slightly anomalous values in arsenic, copper, zinc, and molybdenum.

Leasable Minerals. Little interest has been expressed in oil and gas exploration in the Blacktail Range. The Blacktail Range contains both source and reservoir rocks, as do many of the other ranges in southwestern Montana. The southwestern part of the WSA, which is composed mainly of Precambrian rocks, has very little oil and gas potential. If future geophysical work discloses that the entire block is part of a thrust sheet, there may be potential for oil and gas below the Precambrian rocks.

There are horizons of coal in both the Heath formation and some of the Tertiary. The coal is generally thin and of poor quality.

Geologic maps show that the Phosphoria Formation does not crop out within the WSA. Oil shale was quarried and retorted west of the WSA in Small Horn Canyon in 1919. The operation proved not to be commercial. There are extensive outcrops of Heath Formation in the WSA. That formation includes oil shale horizons that may contain anomalous metal values (vanadium, among others). Oil yields in the Heath show a range from 0 to 19.6 gallons per ton, with an average of 10 gallons per ton (Mont. Bur. Mines & Geol. 1981).

Mining Claims, Leases, and Permits

There are about 109 unpatented mining claims in the WSA. They are generally along the northeast border and in the vicinity of the Silver Queen mine in the southeast.

The entire WSA is covered with oil and gas leases (see the Blacktail Mining Claims and Mineral Leases map). Most of these are post-FLPMA leases, which carry the wilderness protection stipulation. There are no leases for coal, oil shale, phosphates, or geothermal energy in the unit.

Mineral Resource Potential

Available information indicates that the overall mineral potential of the WSA is low, with two exceptions: The vicinity of the fault along the northeast face of the Blacktail Mountain range has good potential for small deposits of silver, copper, and gold, and the area surrounding ultramafic rocks in Jake Creek has fair potential for nickel. The potential for nickel is probably limited, however, because its occurrence in the area is limited (see the Blacktail Mineral Potential map).

Some potential for recovery of metals is associated with oil shale in the Heath Formation. The southeast end of the unit has a fair potential for talc, chlorite, and associated metamorphic minerals.

Oil shale in the Blacktail Mountains is low grade; there is little likelihood that there will be any interest in it in the future.

With little specific information beyond general statements that the area "has high potential for oil and gas," it is difficult to estimate the unit's oil and gas potential.

Available information suggests the oil and gas potential is fair to poor. The potential for geothermal energy, coal, and carbon dioxide is likewise a matter of speculation.

Livestock Grazing

The WSA contains parts or all of three grazing allotments for which AMPs are proposed, and one custodial allotment. The total acreage not leased for grazing is 3,882.

AMP Allotments

The Matador-Blacktail Allotment (0147) contains 8,456 acres, all of which is inside the boundaries of the WSA. Its capacity is 176 AUMs. Cattle graze on this allotment from July through September on a two-pasture, deferred rotation grazing system. The Mountain Foothills EIS projects that the number of AUMs will increase to 199 by 2010.

There are no existing range improvements in this allotment, and none have been proposed.

The Gallagher Mountain Allotment (0013) contains 14,517 acres; 1,660 acres (11%) are inside the WSA boundaries. The part of the allotment within the WSA is the Sheep Canyon pasture, which is used in August of one year and in September of the next year. Another pasture outside the WSA is paired with this pasture to make the rest-rotation system work. The Sheep Canyon pasture has a grazing capacity of 220 AUMs, of which 138 AUMs are inside the WSA. The allotment's total grazing capacity is 4,222 AUMs; it is projected that this will increase to 4,260 by 2010.

There are no existing or proposed range improvements in the part of this allotment that lies within the WSA.

The Conover Allotment (0117) covers 4,035 acres of public land; approximately 2,530 acres (63%) are inside the WSA boundaries. Sheep use a total of 286 AUMs on a deferred rotation system from mid-July to mid-September; 74 AUMs are within the WSA. The Mountain Foothills EIS projects that there will be 291 AUMs in this allotment in 2010.

One spring development is proposed for the part of this allotment that is inside the WSA; there is an existing spring development in the unit already. Motorized equipment may be needed for construction of proposed developments and on an occasional basis thereafter for major maintenance and reconstruction of proposed and existing improvements.

Custodial Allotments

All of the 1,114 acres of the Mooney Custodial Allotment (0178) is inside the WSA. Thirty-five AUMs of cattle use takes place from July through October.

Timber Management

The Blacktail Mountains WSA contains approximately 9,100 acres of forestland. Of this, 2,002 acres (22%) are on slopes of more than 70%. The acreage on slopes suitable for cable yarding is 3,640 (40%); 3,456 acres (38%) are on slopes suitable for tractor logging.

This range is steep and rugged. Much of it that was logged around 1900 now has dense stands of Douglas-fir and lodgepole pine. Wet areas are stocked with spruce and subalpine fir. Some areas are characterized by soils made fragile by seepage. Steep glacial cirques are timbered with alpine fir and spruce. Exposed ridges of bare rock are common; road development would be expensive.

The EAUs are evaluated in table 7. Appendix C describes the assumptions used in the BLM timber analysis.

TABLE 7
PRESENT NET WORTH OF TIMBER:
BLACKTAIL MOUNTAINS WSA

	Economic Analysis Unit (EAU)		
	1	2	3
Present timber acreage[1]	1,567	1,971	761
Miles of road	13.1	20.2	13.0
At 4% discount rate			
Present value of timber	$202,433	$163,606	$31,694
Road costs	327,013	320,149	92,606
Present net worth	-$124,580	-$156,543	-$60,912
At 7-3/8% discount rate			
Present value of timber	$58,167	$15,053	-$3,392
Road costs	255,248	133,161	28,032
Present net worth	-$197,081	-$118,108	-$31,424

[1]After timber production capability class (TPCC) reductions (see Appendix C).

EAST FORK OF BLACKTAIL DEER CREEK WSA (MT-076-007)

The East Fork of Blacktail Deer Creek WSA, which comprises 6,230 acres of public land, is about 33 miles southeast of Dillon, Montana. The public can reach the area via the improved Blacktail Deer Creek road and then a more primitive road that runs up the East Fork of Blacktail Deer Creek to the boundary.

This WSA is roughly triangular, with an irregular boundary that almost entirely follows legal subdivisions. There is private land on the north; the state-owned Blacktail Game Range essentially forms the northwestern boundary. Land on the east and south is Beaverhead National Forest land. There are no inholdings, but a road corridor that is excluded from the WSA extends into the body of the unit for more than 1 mile along the East Fork road, forming an intruding "finger."

The unit is dominated by three relatively large drainages: the East Fork of Blacktail Deer Creek; Crows Nest Creek, which flows into the East Fork; and Robb Creek. Portions of Taylor, Rock, Indian, and Alkali creeks are also in the WSA, as are several smaller streams that flow directly into the East Fork. The WSA, which is on the west slope of the Snowcrest Range, contains open sagebrush foothills, grass parks, aspen and willow groves, alpine meadows, barren talus slopes, and Douglas-fir and limber pine forests.

Wilderness

Quality of the Wilderness Resource

Naturalness. Vehicle ways totaling less than 3 miles extend into the WSA for short distances. Most of the fences are adjacent to the boundary, as are a few undeveloped camps. The naturalness of the East Fork WSA is one of its outstanding characteristics. Table 8 details the impacts on naturalness, and they are shown on the East Fork Developments and Allotments map.

Outstanding Opportunities. The configuration of this relatively small unit is affected by the road corridor along the East Fork and by the irregular northwestern boundary. Core-to-perimeter distance is limited to about 1 mile.

The road up the East Fork effectively divides the WSA into two pieces with about one-third of the unit southwest of the road and two-thirds northeast. Essentially, users must choose which side of the road to visit.

About 90% of the WSA lies in very well-dissected terrain; the remaining 10% is moderately rolling. Elevations vary from about 7,120 feet along the East Fork of Blacktail Deer Creek to 10,581 on Sunset Peak. Local relief and dissection serve to separate visitors from one another. Timber and aspen-willow groves occupy about 60% of the area, providing pockets of seclusion among the interspersed meadows and parks.

The alpine northeastern part of the unit is the only area where vegetative screening is absent. The open country of upper Crows Nest basin would not accommodate a large number of visitors, but it presumably would attract visitors. The 3-mile long Crows Nest drainage is the only drainage entirely enclosed by the unit's boundaries.

The minimal offsite influences are views of undeveloped state, national forest, and private land. There are distant off-unit views of land outside the WSA from many of the open high points. Overall, this effect is not considered significant.

Opportunities for hiking and backpacking in the unit are excellent. Horseback riding also is possible, but it is limited by the steep topography. A feature of interest to visitors is the way plant communities ranging from grass-sagebrush to alpine can be seen in a short distance.

Opportunities to observe and photograph scenery, wildlife, and plant communities are excellent in the WSA. Fossil-bearing formations of geological interest outcrop along the alpine ridge. Elk and mule deer are found here; this area offers some of the most outstanding elk hunting in southwestern Montana. Moose and black bear also use the area, and mountain goats are found in the higher elevations. Opportunities for trout fishing are good in the East Fork.

Although size and configuration limit the carrying capacity of the area, the variety and excellent quality of opportunities in the unit render the area's value rather high for primitive recreation.

Special Features. The WSA contains important spring-summer-fall elk range and elk calving habitat, complementing the adjacent Blacktail Game Range, which serves primarily as winter range for elk. The WSA also offers excellent spring-summer-fall range for mule deer and contains habitat for moose and mountain goats.

High quality scenery, including views of the high Snowcrest peaks and the diverse vegetative patterns in the unit, is an important special feature.

Summary of Wilderness Quality. This WSA has high wilderness values because of its natural character, special features, and the opportunities for primitive recreation associated with its special features. While vegetation and topography offer very good potential for seclusion, the size and configuration of the unit limit these opportunities and the area's carrying capacity.

TABLE 8
EFFECTS ON NATURALNESS
EAST FORK OF BLACKTAIL DEER CREEK WILDERNESS STUDY AREA (MT-076-007)

Feature	Legal Location	Location within Unit	Length/ Area	Overall Impact	Remarks
Vehicle Way I	T11S, R5W, Secs. 27, 28, 32, and 33	Southwest corner of unit; intersects East Fork road outside unit	2.5 miles	Low	Vehicle way ends just outside unit in saddle in T12S, R5W, Sec. 4. Upper reaches of way partly constructed at one time, but is naturally revegetated and recontouring. Most of way is two wheel tracks. It is now closed to vehicle traffic.
Vehicle Way II	T11S, R5W, Sec. 22	Northern edge	0.3 mile	Very Low	Two-wheel track extending a very short distance into unit. Now closed to vehicle travel.
Fence	T11S, R5W, Secs. 27, 32, 34 and 35	Along East Fork of Blacktail Deer Creek, in southwest corner of WSA.	3.5 miles	Low	One mile in extreme southwest corner; 2.5 miles along road corridor and East Fork.
Undeveloped camps	T11S, R5W, Secs. 27 and 34	Along East Fork road	3.0 acres	Low	Along East Fork road corridor, just inside unit. Extending the corridor would easily exclude these.

Ecosystem Representation

This unit contains four major ecosystems: Douglas-fir forest, alpine meadows and barrens, foothills prairie, and sagebrush steppe. See Appendix E and the Ecotypes map for East Fork WSA.

Manageability

Vehicle use is already restricted in this WSA under the Dillon travel plan. The only place where topography is suitable and vehicle management problems would be likely to occur is the open, moderately sloping terrain in the southwest part of the unit.

This unit's size and configuration present a management problem because the road corridor divides this small unit and renders it effectively smaller than its actual acreage.

Except for the boundary along the road corridor, the boundaries of the WSA lie entirely along legal subdivisions unrelated to the dominant topographic features. Thus, the unit's configuration is not related to features that would be easily identifiable on the ground.

Opportunities and Objectives

Improving Wilderness Quality. The insignificant number of human imprints does not seriously impair the unit's wilderness quality. The existing vehicle ways will rehabilitate naturally over time with or without wilderness protection, because vehicle restrictions are already in effect in the area. Only the short portion of vehicle way I, which was once constructed, would require a longer period to become unnoticeable.

Improving Manageability. Closing the East Fork road at the unit boundary would eliminate the internal configuration problem; however, the road would remain as an impact on naturalness without mechanical rehabilitation. In any case, the small size and irregular boundaries would continue to cause problems in management of the area.

With compatible management of adjacent lands, this WSA could be effectively managed as wilderness. The existing management of the state-owned Blacktail Game Range and the currently undeveloped national forest lands complements the use of the WSA as a backcountry area. However, what the long-term management of those adjacent lands will be is uncertain, and that uncertainty makes equally uncertain the manageability of the East Fork WSA as wilderness.

Recreation

The WSA offers a variety of opportunities for high quality recreation, including fishing, hiking, sightseeing, photography, camping, and hunting for big game and upland game birds. The estimated annual number of recreation visits is 1,300. About 65% of these occur during the fall hunting season, and many involve the use of motorized vehicles on the East Fork road.

Public lands in this WSA and the adjacent Beaverhead National Forest provide some of the best elk hunting opportunities in southwestern Montana, and this is one of the most popular hunting areas. It is not unusual to see eight large hunting camps along the road corridor that partially divides the WSA, with as many as 15 members in each hunting party. Summer visitors come primarily for weekend fishing and camping.

The only access road into the area traverses the state-administered Blacktail Game Range for much of its length, so access is restricted to summer and fall. The Dillon ORV travel plan restricts vehicle travel within the WSA to the main access road, and that road, along with the entire WSA, is closed to all vehicles from December 1 to May 15.

Upper end of Crows Nest Creek drainage.

Wildlife

The WSA offers primarily spring-summer-fall range for elk. The degree to which this area is used in the spring and fall of any given year is weather-dependent. In the fall, elk move to lower elevations, crossing the WSA or remaining there during the hunting season. Depending on hunter activity and weather conditions, most of the elk are on the adjacent Blacktail Game Range by the first week of December. Approximately 800 to 1,000 elk winter in the game range, primarily on south-facing and east-facing slopes. The entire WSA is important calving ground for the elk that use the Blacktail Game Range in winter and spring. This calving occurs primarily from May 17 to June 4 (Reichelt 1973).

The unit provides spring-summer-fall habitat for a moderate population of mule deer, and the habitat is considered excellent.

A moose population inhabits the Blacktail Game Range and this WSA. Along with the Gravelly-Snowcrest area, the WSA is considered excellent moose range, and it could support more moose than now inhabit the area. A viable population of black bears lives in the WSA, which provides suitable yearlong habitat. Mountain goats are commonly found at higher elevations in this WSA.

Blue grouse, ruffed grouse, and spruce grouse are found in the unit, which offers a wide diversity of habitat for these species. Furbearing species known to occur in the area include mink, beaver, muskrat, and marten. Bobcats are occasionally reported in the unit.

The unit contains 3.4 miles of the East Fork of Blacktail Deer Creek, which originates in the Snowcrest Mountain Range. The stream is a popular fishing area for pan-size trout. Species include brook trout, rainbow, cutthroat, rainbow-cutthroat hybrids, and mountain whitefish.

Geology and Minerals

Reconnaissance studies in this area were done by Klepper (USDI, GS 1950) and by Scholten, Keenmon, and Kupsch (1955). This report is based on mapping conducted by Klepper. No detailed geologic mapping of the area has been done. A field check of the area was conducted in August 1981.

Geologic Setting

This WSA lies on the west flank of an overturned anticline that stretches the length of the Snowcrest Range. Sediments of Paleozoic through Cretaceous age have been involved in the anticline. Precambrian granite gneiss occurs on the upper thrust plate along the west

side of the range (see the Regional Geology map and the General Geology map for the East Fork WSA).

Rock Units

Rocks varying in age from Precambrian through Tertiary are present in the WSA.

Geologic Structure

The structural pattern in the WSA trends southwest-northeast. Throughout the region earlier structures have been modified and obscured by late Cenozoic block faulting.

The Snowcrest Range represents the east limb of a long anticline. Along much of its length it has been overturned and overthrust from the west. The major structural features were formed during the Laramide Orogeny. The Snowcrest Range was probably uplifted during the late Tertiary. Block faulting along range fronts may have contributed to the present topography. Recent evidence from seismic exploration seems to indicate that the characteristic overthrusting has taken place over pre-existing structures that are Paleozoic or Laramide in age. These downdropped blocks, or "pull apart" structures, are perpendicular to the general structural grain present now.

Known Mineral Deposits

Locatable Minerals. The Precambrian gneisses and granite gneisses of the Snowcrest Range are not highly mineralized, and there are no known mineral occurrences in the gneiss within the unit's boundaries. None of the sedimentary units except the Permian Phosphoria Formation are noted for containing anomalous metal values.

The Phosphoria Formation, which cuts across the southeast corner of this WSA, contains both uranium and vanadium. The potential for recovery of these minerals is discussed in the "Blacktail Mountains WSA" section.

Gypsum is known to be present in Section 5, T12S, R5W. There apparently has been no recent activity, and available information indicates that potential is limited.

Leasable Minerals. Little interest has been expressed in oil and gas in the Snowcrest Range specifically. The range contains both source and reservoir rocks, as do many of the other ranges in southwestern Montana.

Coal is present in some formations within the Tertiary, but it is generally thin and of poor quality.

The Phosphoria Formation cuts across the southeast corner of the WSA. Some members of this formation are known to contain distillable hydrocarbons. No oil shale values are available for the Phosphoria Formation in the Snowcrest Range. Values from the same formation in the Small Horn Canyon area in southwest Montana range from 15 to 20 gallons per ton, but oil shale production probably will remain uneconomical far into the future.

No analyses of the phosphate in this area are available. The phosphate in the WSA is not amenable to strip mining because of the steep dips, so any development would need to be underground.

No interest has been expressed in the development of phosphate resources in the Snowcrest Range. Many other phosphate deposits in southwestern Montana are more amenable to development than the deposits in the Snowcrest Range.

Mining Claims, Leases, and Permits

No mining claims have been recorded in the WSA or the surrounding area, and there are no leases for phosphate or oil shale. The entire WSA is under oil and gas leases or lease applications (see the East Fork Mining Claims and Mineral Leases map). The Dillon MFP recommends no surface occupancy on mineral leases for virtually the entire WSA.

Mineral Resource Potential

As in the WSAs already discussed, no specific information is available on the oil and gas potential of the WSA. Recent geophysical work suggests there may be targets in pre-existing structures below thrust planes northwest of the WSA. Available information suggests that oil and gas potential may decline near the crest of the Snowcrest Range.

The unit contains potential resources of phosphate and oil shale, and it may have potential for carbon dioxide and silica. Its potential for metalliferous deposits is limited, as is the potential for industrial minerals. On the basis of currently available information, the overall mineral potential of this WSA is rated as low.

Livestock Grazing

The WSA contains all of one AMP allotment and no custodial allotments. The total land not leased for grazing is 191 acres.

The Robb Creek Allotment (0167) contains 6,039 acres, all of which lie inside WSA boundaries. There are 467 AUMs in the allotment, which is divided into two pastures on opposite sides of the East Fork of Blacktail Deer Creek. Cattle use the pastures on an alternate rest grazing system—one pasture rests while the other is grazed in alternate years. Allotments on Forest Service land adjacent to each pasture are used the same way as the BLM land. The Mountain Foothills EIS projects that the number of AUMs for this allotment in 2010 will remain the same.

There are two spring developments proposed for this allotment and a total of about 2 miles of fence along the creek divides the two pastures. Motorized equipment may be needed for the construction of the spring

developments and on an occasional basis thereafter for major maintenance and reconstruction of the fence and spring developments. No further range improvements are proposed for this allotment.

The importance of this allotment is its use for cattle grazing each August by members of the Robb Creek Grazing Association. A rider is kept with the cattle when they are on this summer range to prevent trespass.

Timber Management

The East Fork WSA contains approximately 2,554 acres of forestland. Of this, 920 acres (36%) are on slopes of more than 70%. The acreage on slopes suitable for cable yarding is 1,481 (58%); 153 acres (6%) are on slopes suitable for tractor logging.

This area, which adjoins the Blacktail Game Range, is important range for elk. For this reason, timber cutting is restricted under the current Dillon MFP.

Timber values for all EAUs in the WSA are evaluated in Table 9. Appendix C describes the assumptions used in the BLM economic analysis.

TABLE 9
PRESENT NET WORTH OF TIMBER:
EAST FORK OF BLACKTAIL DEER CREEK WSA

	Economic Analysis Unit (EAU)	
	1	2
Present timber acreage[1]	772	457
Miles of road	13.0	4.4
At 4% discount rate		
Present value of timber	$88,679	$27,993
Road costs	570,178	31,869
Present net worth	-$481,499	-$3,876
At 7-3/8% discount rate		
Present value of timber	$24,779	-$178
Road costs	614,086	9,399
Present net worth	-$589,307	-$9,577

[1]After timber production capability class (TPCC) reductions (see Appendix C).

HIDDEN PASTURE CREEK WSA (MT-076-022)

The 15,509-acre Hidden Pasture Creek WSA is in the southern Tendoy Mountains about 40 air miles south of Dillon, Montana. It forms a partial "U" shape around contiguous land of the Beaverhead National Forest. There is a state-owned inholding in Section 16, T13S, R10W.

The south and west boundaries of the unit are formed mostly by roads, with some formed, like the entire eastern boundary, by the border between public and nonpublic lands. The boundary on the north and the inside of the "U" is the border between BLM-administered land and Beaverhead National Forest.

Most of the WSA is open sagebrush and grassland, with some small patches of timber and mountain shrubs.

More than 40 minor drainages, most of which are seasonally dry, radiate in all directions from the center of the unit. Hidden Pasture Creek, which flows south and southeast through the unit for about 3 miles, is the only major drainage.

Wilderness

Quality of the Wilderness Resource

Naturalness. The Hidden Pasture unit contains more than 21 miles of vehicle ways, about 17 miles of fences, and 11 spring developments, which are near the heads of shallow drainages.

Sagebrush spraying was done on approximately 9,500 acres in the northern part of the unit in the early 1960s. At about the same time, contour furrowing was done in nine separate areas, a total of 722 acres. The effects of these activities are no longer readily apparent.

Two vehicle ways, two spring developments, and some of the fencing in the unit were judged to have a low to moderate impact on naturalness. The other constructed features were judged to have a low impact. Although the number of impacts is relatively high in this WSA, their locations and spatial distribution help to mitigate the cumulative impact on the apparent naturalness of the whole unit. Table 10 details the impacts on naturalness, and their locations are shown on the Hidden Pasture Developments and Allotments map.

Outstanding Opportunities. The core-to-perimeter distance of this unit is approximately 1.5 miles. Cross-country travel is not difficult because most of the drain-

TABLE 10
EFFECTS ON NATURALNESS
HIDDEN PASTURE CREEK WILDERNESS STUDY AREA (MT-076-022)

Feature	Legal Location	Location within Unit	Length/ Area	Overall Impact	Remarks
Vehicle Way I	T12S, R10W, Sec. 30	Extreme northwest corner of unit	1.0 mile	Low	Two-wheel track leads uphill.
Vehicle Way II	T12S, R10W, Secs. 31, 32; T13S, R10W, Secs. 5, 6	Cuts across the northwest corner of the unit	3.5 miles	Low	Two-wheel tracks lead to a high ridge and along the ridge.
Vehicle Way III	T12S, R10W, Sec. 32	Northwest part of the unit	Less than 0.5 mile	Low	Two-wheel track is a spur of Vehicle Way II, which runs along the ridge.
Vehicle Way IV	T13S, R10W, Secs. 8, 9	Cuts across north central part of unit	1.5 miles	Low	Mostly two-wheel track, but constructed in some places.
Vehicle Way V	T13S, R10W, Secs. 17, 20, 21, 28, and 29	Runs down through west central part of unit	3.0 miles	Low to moderate	Once coristructed but not maintained and is not used much. Visible from several high points.
Vehicle Way VI	T13S, R10W, Secs. 15, 21, 22, and 28	Runs through central part of unit	4.0 miles	Low to moderate	Constructed in places; two-wheel track in others. Visible from several high points.
Vehicle Way VII	T13S, R10W, Secs. 22, 26, and 27	Runs through south central part of unit	1.5 miles	Low	Two-wheel track primarily in drainage bottom.
Vehicle Way VIII	T13S, R10W, Sec. 27	South central part of unit	Less than 0.5 mile	Low	Two-wheel track; spur of Vehicle Way VII. Runs up to high point.
Vehicle Way IX	T13S, R10W, Sec. 26	South central part of unit	Less than 0.5 mile	Low	Faint tracks lead up Hidden Pasture Creek. Spur of Vehicle Way VII.
Vehicle Way X	T13S, R10W, Sec. 15	Near boundary in north central part of unit	0.25 mile	Low	Old vehicle way has washed out near boundary.
Vehicle Way XI	T13S, R10W, Secs. 17, 18	West edge of unit	1.0 mile	Low	Some past construction; little maintenance or use.
Vehicle Way XII	T13S, R10W, Secs. 33, 34	Southwest part of unit	1.5 miles	Low	Two-wheel track.
Vehicle Way XII	T13S, R10W, Secs. 33, 34	Southwest part of unit	1.5 miles	Low	Two-wheel track.
Vehicle Way XIV	T13S, R9W, Secs. 19 and 20	Southeast edge of unit	1.5 miles	Low	Makes short loop through southeast corner of unit.
Fences	T12S, R10W, Secs. 30, 31; T13S, R10W, Secs. 5, 6, 8, 17, 20, 21, 28, 29, 32, 33, 34, 35; T13S, R9W, Secs. 7, 18, 19, and 30	Throughout most of the unit	17 miles	Moderate	Approximately 10 miles of fence are within 0.25 mile of boundary; the rest are 1 to 2 miles inside. Most is on west side. Both wood and steel posts.
Spring development	T12S, R10W, Sec. 31	Northwest corner of unit	Less than 1.0 acre	Low	Unmaintained; two water troughs.
Spring development	T13S, R10W, Sec. 22	Central part of unit	Less than 1.0 acre	Low to moderate	Development is in a basin — 1,000-gallon tank plus several troughs.
Spring development	T13S, R10W, Sec. 28	Central part of unit	Less than 1.0 acre	Low	Recently fenced; in steep gully.
Spring development	T13S, R9W, Sec. 19	East edge of unit	Less than 1.0 acre	Low	Single trough with associated pipeline is in broad basin.
Six spring developments	T13S, R10W, Secs. 15, 17, 20, 21, and 32	All within 1 mile of boundary	Less than 1.0 acre	Low	One development has 1,000-gallon tank.
Prospect pit	T13S, R10W, Sec. 26	In Hidden Pasture Creek drainage, central part of unit	Less than 1.0 acre	Low	Consists of three trenches, each 10 feet x 30 feet x 3 feet.
Old cabin	T13S, R10W, Sec. 26	In Hidden Pasture Creek drainage, central part of unit	Less than 1.0 acre	Low	Cabin is partially decayed.
Sagebrush spraying		North half of unit	9,480 acres	Low	Spraying was done in 1966. Results are not very noticeable now.
Contour furrowing	T13S, R10W, Secs. 17, 20, 21, 28, and 29	West central part of unit	722 acres	Low	This 1962 furrowing is no longer very noticeable.

ages are relatively shallow. It is possible to travel up the drainages and along the open ridges. There is no year-round water source or other attraction that would tend to cause people to congregate in a certain area, so use is likely to be dispersed over the whole area.

Terrain is rolling and moderately well-dissected in about 80% of the unit, well-dissected in 15% and relatively undissected in 5%.

There is little vegetative screening in the 80% of the area that is open sagebrush and grassland. Vegetative screening is greater in the forested and shrub areas, about 20% of the WSA, in the southeastern part of the unit.

Much of the unit slopes toward nonwilderness lands. Off-unit vistas are primarily undeveloped private, state, and federal lands; occasionally there are views of irrigated ranch lands. These views have only an insignificant effect on the opportunities for solitude.

The intensive inventory found that the WSA did not have outstanding opportunities for primitive types of recreation; however, the unit is well suited to cross-country hiking, deer, elk, and antelope hunting, and horseback riding. Most use would probably be for short visits only because of the area's size and lack of surface water. The terrain does not make cross-country travel particularly challenging. Overall, although the area provides opportunities for some types of primitive recreation, neither the diversity of opportunities nor the quality of any one opportunity is outstanding.

Special Features. This WSA provides yearlong mule deer habitat and good antelope habitat. There is good spring-summer-fall range for a small elk population, and reintroduction of bighorn sheep is planned. Cultural resource values are considered high.

Summary of Wilderness Quality. Although this WSA meets the minimum criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation as defined in the Wilderness Act of 1964, the overall quality of these characteristics is rather low. The unit's configuration and small core-to-perimeter distance also detract from its wilderness quality. Its special features, i.e., its value as a location for the reintroduction of bighorn sheep, are its most outstanding characteristics.

General view of south end of unit.

Ecosystem Representation

The WSA contains three basic ecosystems. The major ecosystem is the sagebrush steppe community, which dominates most of the western half of the unit. The foothills prairie ecosystem is interspersed with the sagebrush steppe. Small patches of the Douglas-fir forest ecosystem are found in the southeast and extreme northwest parts of the unit. See Appendix E and the Hidden Pasture Ecotypes map.

Manageability

The roads that form most of the south and west boundaries of the unit are easily identifiable on the ground. The other boundaries, borders between BLM-administered land and nonpublic or national forest lands, do not correspond to any vegetative or topographic features that are easily identifiable. There are few barriers to impede vehicles from entering the unit from the bordering roads or other places, and the short core-to-perimeter distance and the unit's overall configuration would cause problems in managing this unit as a wilderness.

The entire study area is leased for oil and gas, all of it under leases issued before the passage of FLPMA. Leases issued before FLPMA do not have a wilderness stipulation attached; they could be developed even if the development would impair wilderness characteristics.

Problems could arise in management of this unit as a wilderness because of the "grandfathered" right to use motor vehicles to maintain the fairly large number of existing range improvements.

There are no recorded mining claims in this WSA.

Opportunities and Objectives

Improving Wilderness Quality. Most of the vehicle ways in the unit are two-wheel tracks that would revegetate to the point of being almost completely unnoticeable in only a short time if traffic on them was restricted. Vehicle ways IV, V, and VI, on which some construction has been done, would need longer to disappear.

Some boundary adjustments could be made to eliminate some human imprints near the present boundaries, including about 10 miles of fence and three spring developments.

Improving Manageability. The only possible land tenure adjustment that could improve the manageability of this unit would be acquisition of state Section 16, T13S, R10W, which is essentially an inholding. If the BLM acquired this section it would add one of the major high points in the area to the WSA and eliminate the problems associated with an inholding.

The only real opportunity for using physiographic boundaries is in the southeast part of the unit, where a shallow drainage could be followed in Section 30, T13S, R9W. This would eliminate the entire narrow eastern leg of the "U," which would be difficult to manage.

Recreation

Recreation opportunities available in the unit are hiking, sightseeing, photography, and big game hunting. The quality of deer and elk hunting is considered above average; the quality of opportunities for other forms of recreation is considered average. No visitation figures are available for this unit, but recreation use is relatively light except during the fall hunting season, and involves the use of motorized vehicles.

Current vehicle restrictions under the Dillon ORV plan limit vehicle travel within the unit to four existing interior routes. Travel on these routes is permitted from May 16 to November 30. All vehicle travel is prohibited from December 1 to May 15.

A part of Section 36, T13S, R10W, which is inside the WSA, is withdrawn for a BLM recreation site, but there is no current proposal for construction of such a facility.

Wildlife

A small elk population inhabits the WSA, and it is considered good spring-summer-fall range for elk. Crucial elk winter range is also found in the WSA.

Yearlong mule deer habitat is found in this WSA, with the winter range found in the eastern and southern parts.

Pronghorn antelope are found primarily on the sagebrush/grassland ridges and lower foothills of the unit.

No bighorn sheep currently inhabit the unit; however, a reintroduction of bighorn sheep is planned.

A sage grouse strutting ground (breeding-nesting complex) has been identified in the western portion of the unit.

Geology and Minerals

Mineral resources of the general area of the Hidden Pasture Creek WSA were studied by Geach (Mont. Bur. Mines & Geol. 1972). A reconnaissance study of the area is described in a 1955 article (Robert Scholten, K. A. Keenmon, and W. O. Kupsch, "Geology of the Lima Region, Southwestern Montana and Adjacent Idaho," *Geological Society of America Bulletin* 66 [1955], pp. 345-404). This article will be cited hereafter as "Geology SW Mont."

Geologic Setting

The Tendoy Mountains, in which this unit lies, flank the west side of the north-trending Lima Valley, from which the front rises abruptly and regularly and has character-

istics of a fault scarp (Mont. Bur. Mines & Geol. 1972). Movements beginning in the Pliocene or earlier may have caused displacement of as much as 3,000 feet along the fault (Pardee 1950). The mountains are of late Paleozoic rocks, metamorphic rocks, and some Mesozoic strata. See the Geologic Sketch of the Southern Tendoy Mountains.

Rock Units

Rocks varying in age from Paleozoic through Tertiary are present in this WSA. The unit contains no metamorphic or igneous rocks.

Geologic Structure

According to "Geology SW Mont.," the most prominent Laramide structural elements consist of northeast-trending folds, northwest to north-trending folds, northwest-trending low angle thrusts, and northwest-trending high angle thrusts.

A prominent structural feature near Hidden Pasture and Little Water creeks is a sharply folded syncline called the Little Water. Its axis pitches steeply southwest. The principal fault, a low angle thrust, is called the Medicine Lodge Overthrust. The thrust trace winds irregularly through the Tendoy Range in the area of Little Sheep Creek and Big Sheep Creek.

The high-angle Tendoy Thrust is in the southeastern part of the WSA. Muddy Creek basin, near the western boundary of the unit, is a structural graben bounded on the east and the west by normal faults.

Known Mineral Deposits

Locatable Minerals. There are no known occurrences of locatable minerals in the WSA. Concentrations of gypsum occur in several locations southeast of the unit, in the shaley and limey beds of the carboniferous Big Snowy Formation. The formation extends into the southeast corner of the unit, but no discoveries of gypsum in this area are known.

Beds of bentonite are intercalated in the Tertiary Medicine Lodge beds formation. "Geology SW Mont." says they are of sufficient purity to be of industrial value only locally. In almost all occurrences, inaccessibility would make the cost of transportation prohibitive for commercial extraction.

Leasable Minerals. Source bed and reservoir rocks are present in the WSA, so the possibility of oil and gas production cannot be ruled out; however, this structurally complex area is far from production areas. Two dry oil and gas wells have been drilled just outside the unit on private land in Section 29, T13S, R10W.

Thin coal beds are intercalated in Tertiary basin beds in several places in the WSA, but none of them have been mined. This lignite generally has a high ash content and is of little value.

Information on oil shale deposits in this unit is limited, but deposits here are apparently much thinner and lower in grade than those in Wyoming, Utah, and Colorado. Some members of the Permian Phosphoria Formation are known to contain distillable hydrocarbons.

Phosphate is disseminated in two shaley units near Dell, Montana, which are reported to contain less than 32% P_2O_5. Most of the deposits in this area are of low quality, with some fairly thin high-quality layers; however, some deposits such as those in the northeastern part of T14S, R10W, may be amenable to strip mining.

Mining Claims, Leases, and Permits

No unpatented mining claims have been recorded and there are no leases for phosphate.

There are ten existing oil and gas leases for this area (see the Hidden Pasture Mining Claims and Mineral Leases map). These leases were issued before the passage of FLPMA, so they do not carry the wilderness protection stipulation.

Mineral Resource Potential

The unit's potential for metalliferous deposits is limited. There may be potential for gypsum, since there have been reports of this mineral near the WSA. There also may be potential for building stone.

Interest shown by industry seems to indicate that the WSA has good potential for oil and gas. There is also potential for phosphate, but deposits in the Tendoy Range probably will remain uneconomical well into the future, while existing deposits in Idaho continue to supply the bulk of the western production.

Oil shale deposits in the unit apparently are thinner and lower grade than those in other states, so prospecting and development seem unlikely. Coal in the WSA is in narrow seams and of unfavorable quality; operating coal mines in eastern Montana offer large-scale operations and higher quality coal.

Livestock Grazing

Parts of two AMP allotments, one allotment for which an AMP is proposed, and one custodial allotment are within the borders of the Hidden Pasture WSA. Total land not leased for grazing is 370 acres.

AMP and Proposed AMP Allotments

The Muddy Creek Allotment (0039) covers 14,305 acres. Approximately 9,880 acres (69%) are inside WSA boundaries. The total of AUMs is 1,649; 1,548 are within the WSA. Cattle graze from mid-June through early November on a four-pasture rest-rotation system. The projected number of AUMs for 2010 is 1,698, according to the Mountain Foothills EIS.

Approximately 7.5 miles of fence are inside the WSA. Most of the part of this allotment that is within the WSA has been sprayed at some time in the past, and contour furrowing has been done on about 400 acres. It may be necessary for motorized equipment to enter the area periodically to maintain the fence.

No further improvements are proposed for the part of the allotment that is inside the WSA.

The Dixon Mountain Allotment (0022) contains 2,004 acres, with 1,242 acres (62%) inside the boundaries of the WSA. The AUMs total 291; 228 of these are within the WSA. Cattle use the allotment for one month in the spring and one month in the fall. The grazing system is a three-treatment rest-rotation on four pastures (two pastures receive the same treatment). The Mountain Foothills EIS projects that this allotment will have 301 AUMs in 2010.

There are about 1.5 miles of fence inside the WSA; another mile of fence forms part of the WSA boundary. There are two spring developments and about 0.5 mile of pipeline. It may be necessary that motorized equipment enter the area periodically for major maintenance and reconstruction of these improvements.

No further range improvements are planned for this allotment.

The Nicholia Allotment (0699) has a proposed AMP. It contains 9,617 acres; 3,785 acres (39%) are within the WSA boundaries. Cattle use this allotment during May and June on a rest-rotation system for a total of 1,454 AUMs. Of these, 375 are within the WSA. The number of AUMs projected by the Mountain Foothills EIS for 2010 is 1,701.

There are no range improvements within the WSA now. Developments proposed are two spring developments, one reservoir, and 1.5 miles of pipeline with four associated water troughs. It may be necessary to enter the area with motorized equipment to build and maintain these facilities, which are needed for implementation of the AMP.

Custodial Allotments

One custodial allotment, Hildreth 1-A (0602), is within this WSA. It has 200 acres, all of which are in the WSA. The number of AUMs is 32. It is grazed by cattle from June 1 to June 15 and from November 15 to December 31.

Timber Management

The WSA contains 1,048 acres of forestland. Of this, 346 acres (33%) are slopes of more than 70%. The acreage on slopes suitable for cable yarding is 524 (50%); 178 acres (17%) are on slopes suitable for tractor logging.

Timber stands in this WSA are steep, scattered, and isolated from one another by steep, rugged terrain. Regardless of whether this area was designated wilderness or not, it would not be logged; therefore, it should not be considered part of the harvestable base. No further evaluation is planned.

BELL AND LIMEKILN CANYONS WSA (MT-076-026)

The Bell-Limekiln WSA lies at the north end of the Tendoy Mountains, 2 miles southwest of Clark Canyon Reservoir. The unit, which is shaped somewhat like a mirror-image "L," contains 9,650 acres of public land. There is a 160-acre inholding of private land in Bell Canyon in Sections 14 and 23, T11S, R11W. The unit's boundaries are almost entirely on legal subdivisions between BLM and private, state, or national forest lands, or with other BLM lands. On the southwest, the Johnson Gulch-Deer Canyon road forms the boundary.

The area is a mosaic of grass, sagebrush, and forested ridges, canyons, and slopes. The steep, rugged Bell and Limekiln canyons dominate the topography of the east side of the unit. The southwestern part of the unit is dominated to a lesser degree by forks of Deer Canyon and Johnson Gulch. All drainages are seasonally dry except some springs in Bell Canyon and Limekiln Canyon.

Wilderness

Quality of the Wilderness Resource

Naturalness. Nearly 14 miles of vehicle ways and more than 4 miles of fence are distributed throughout this WSA. Vehicle ways III and V and much of the fencing are relatively noticeable because of the open slopes in the area, but the dissected topography and forest cover in the canyons provide adequate screening from most impacts in these areas. Impacts from grazing are evident in the bottoms.

Although the imprints are relatively light and well-distributed, a visitor cannot travel for any great distance without contacting some sign of human influence. The cumulative effect is a reduction of the quality of the area's naturalness, which is rated low to moderate. Table 11 details the impacts on naturalness. Also see the Bell-Limekiln Developments and Allotments map.

TABLE 11
EFFECTS ON NATURALNESS
BELL-LIMEKILN WILDERNESS STUDY AREA (MT-076-026)

Feature	Legal Location	Location within Unit	Length/ Area	Overall Impact	Remarks
Vehicle Way I	T11S, R11W, Secs. 1, 2	Northern edge of unit, north of Limekiln Canyon	1.0 mile	Low	Two-wheel track on open ridge.
Vehicle Way II and spur	T11S, R11W, Secs. 1, 2	Bottom of Limekiln Canyon and northern spur	2.0 miles	Low	Two-wheel track in stream bottom and on open slope. Some evidence of timber cutting in drainage bottom.
Vehicle Way III and spurs	T11S, R11W, Secs. 10, 11, 12, 13, 14, 15, 22	"Ridge road" on ridge between Bell Canyon and Limekiln Canyon, west of Bell Canyon. Three spurs included.	5.0 miles	Moderate	Partial construction in one 1/4-mile section. Fairly visible on open slopes and ridges.
Vehicle Way IV	T11S, R11W, Sec. 24	Bell Canyon and one short spur leading south	1.25 miles	Low	Two-wheel track up creek bottom. Partially revegetated.
Vehicle Way V	T11S, R11W, Sec. 23	Ridge above Bell Canyon inholding in south central part of unit	0.25 mile	Low to moderate	Two-wheel tracks are unusually visible from high points to north.
Vehicle Way VI	T11S, R11W, Secs. 28, 29	North fork of Deer Canyon in southwest part of unit	0.5 mile	Low	Two-wheel track.
Vehicle Way VII	T11S, R11W, Secs. 20, 29	Just off Johnson Gulch road in southwest part of unit	0.25 mile	Low	Two-wheel tracks leading to high point.
Vehicle Way VIII	T11S, R11W, Sec. 20	In tributary of Johnson Gulch, southwest part of unit	0.25 mile	Low	Two-wheel track.
Vehicle Way IX	T11S, R11W, Sec. 20	Johnson Gulch	0.25 mile	Low	Two-wheel track leads up drainage.
Vehicle Way X	T11S, R11W, Sec. 3	Ridge west and north of upper Limekiln	1.0 mile	Low	Leads short distance into unit, near boundary. Possibly receives fairly substantial use.
Fence #1	T10S, R11W, Sec. 35; T11S, R11W, Sec. 3	From northern boundary to upper Limekiln Canyon	2.0 miles	Low to moderate	Visible along open slope except for unnoticeable section through timber.
Fence #2	T11S, R11W, Sec. 24	Gap fences across Bell Canyon	1.25 miles	Low	Through timber, mostly wood posts.
Fence #3	T11S, R11W, Secs. 10, 11, 15	On divide between Bell Canyon and Limekiln Canyon	1.0 mile	Low to moderate	Fairly visible on high ridge.
Fence #4	T11S, R11W, Secs. 15, 21, 22	On divide between Deer Canyon then down Deer Creek drainage	2.0 miles	Low to moderate	Parallels Vehicle Way III for half its distance. Built under interim management.
Water pipeline	T11S, R11W, Sec. 3	Northeast edge of unit	0.25 mile	Low	Buried pipeline on edge of unit.

Outstanding Opportunities. The configuration of this WSA is poor. Nowhere is the unit more than 3 miles wide, and its width narrows to 1 mile or less in three places. Protrusions of state and private land converge in the central portion of the unit near upper Bell Canyon and the ridge between Bell Canyon and Limekiln Canyon. The inholding, in parts of Sections 14 and 23, T11S, R11W, is also near the center of the WSA.

The core-to-perimeter distance of the WSA is less than 1 mile, but rugged topography makes the actual travel distance somewhat greater. Most of the unit, about 80%, is rugged and well dissected. The terrain in the rest of the unit is rolling. Relief varies from 8,575 feet on the main Tendoy ridge west of Bell Canyon to about 6,040 feet in lower Limekiln Canyon.

Canyon walls vary in relief from about 300 feet in the North Fork of Deer Canyon to about 700 feet in Bell Canyon. The large number of smaller tributary drainages adds to the excellent topographic screening.

The potential for dispersion of visitors is limited by the irregular, narrow configuration. The unit's irregular shape means that some natural topographic routes of travel between points in the unit are outside the WSA. Examples are the routes between upper Limekiln and upper Bell canyons and between upper Deer Canyon-Johnson Gulch and upper Bell.

The WSA encompasses only about 3 miles of each of the two major canyons. This distance is not great enough, given the relatively small size of the unit, to provide exceptional dispersion potential. A positive influence on dispersion potential is the relative mobility of visitors inside the unit—there are few inaccessible points in the WSA.

Vegetative screening within the canyons is excellent. Douglas-fir and tall shrub cover in the canyons (chiefly sagebrush and mountain mahogany) provides for visitor seclusion. However, ridges and south slopes are generally open, and visibility is typically great from ridge to ridge across the deep drainages.

From the higher open ridges of the unit there are distant views of undeveloped private and public lands outside the WSA in the Medicine Lodge Valley, in the Tendoy Range, and in the Red Rock-Clark Canyon area. However, these views are so distant that they have no significant effect on solitude.

Backcountry travel and sightseeing in varied scenery, rock climbing or scrambling, skiing, and snowshoeing are among the recreational opportunities offered by this unit. Excellent mule deer hunting and good elk hunting also are available. Open slopes and deep drainages that could hold snow over the winter contribute to significant winter opportunities with favorable snow conditions.

Primitive recreation opportunities are excellent for the unit's size; however, its small to moderate size and poor configuration limit its carrying capacity. It is expected that most visitors would stay only for a day or overnight.

Meadow in the bottom of Bell Canyon.

Special Features. Excellent, undisturbed yearlong mule deer habitat is a significant special feature of the Bell-Limekiln WSA.

"Wedding Ring Rock," also called "Limekiln Arch," is a feature of geological and historical interest. Paleozoic sedimentary rocks of four formations provide other erosional features of interest, such as cliffs, ledges, peaks, talus slopes, caves, and free-standing rock walls. These features, along with the rugged canyons and the mosaic of timbered and open slopes, contribute to high quality scenery.

Summary of Wilderness Quality. Opportunities for solitude and primitive recreation are relatively good in this unit, given its size and configuration. The rugged drainages and varied terrain, wildlife values, and geological and scenic features also contribute to the area's wilderness quality. However, naturalness is low to moderate, and the unit's irregular configuration detracts from overall wilderness quality by limiting routes of travel and restricting the opportunity to find a secluded spot away from other visitors.

Ecosystem Representation

Ecosystems in this WSA are Douglas-fir forest, sagebrush steppe, and foothills prairie. See Appendix E and the Bell-Limekiln Ecotypes map.

Manageability

Except for the southwestern boundary, which is formed by the Johnson Gulch-Deer Canyon road, the boundaries of this unit are along legal subdivisions. Protrusions of non-BLM land on three sides, near the inholding, give this WSA a poor configuration, which increases management problems.

A large number of vehicle access routes and potential routes affect the WSA. Multiple routes lead to the higher, open ridges, where vehicle control would be difficult. Control of access to the canyons would be relatively easy.

Another problem of manageability is caused by the inholding. There is an existing application for vehicle access to remove timber in this land. There are mining claims in the vicinity of upper Bell Canyon, but there are no claims in the WSA on which a valid discovery has been made.

The entire unit is leased for oil and gas. Leases for the northern and central parts of the unit, including both Limekiln and Bell canyons, were issued before FLPMA, so they do not have wilderness protection stipulations. There is a current application for a permit to drill on one of the pre-FLPMA leases. The access road proposed for this area would run through the WSA for about 5 miles, most of it just upslope from the bordering Johnson Gulch-Deer Canyon road.

Opportunities and Objectives

Improving Wilderness Quality. Parts of vehicle ways II and XI, about one-third of the vehicle way mileage in the unit, would require a substantial amount of time to revegetate. Most of the rest of the vehicle ways would revegetate to the point of being essentially unnoticeable in a relatively short time if traffic was restricted.

Improving Manageability. BLM acquisition of the inholding in Bell Canyon would improve manageability. A topographic boundary could be drawn on the north to eliminate some of the off-unit views, but these are not considered significant external influences that would require an adjustment.

Recreation

The quality of recreation opportunities in Bell and Limekiln Canyons WSA ranges from average to above average. The unit offers opportunities for hiking, sightseeing, photography, and big game hunting. Current hunting activity generally involves motorized use of vehicle ways in the WSA. No estimates of visitation are available for this area, but use is relatively light except during the big game hunting season.

Rough terrain limits motorized recreation opportunities, but there are several feasible routes up some of the drainages and on the ridges.

Wildlife

A population of 50 to 60 elk uses the Bell-Limekiln WSA as part of its yearlong habitat. Small subpopulation herd units like this one are widely distributed throughout the Tendoys. Where livestock grazing is regulated and forage is left for elk, habitat is good. There is potential for additional use by elk.

The primary big game species in this unit, mule deer are found throughout the WSA. Year-round deer habitat is excellent. Deer Canyon is an important deer winter range.

Blue grouse are commonly found in the forested areas of the WSA. Ruffed grouse occur primarily in the aspen stands and in riparian areas adjacent to Douglas-fir habitats.

Geology and Minerals

The mineral resources of the general area of the Bell-Limekiln unit were studied by the Geological Survey (USDI, GS 1953) and by Geach (Montana Bur. Mines and Geol. 1972). A reconnaissance study of the area done in 1955 was reported in an article by Scholten, Keenmon, and Kupsch (1955), cited herein as "Geology SW Mont."

Geologic Setting

The WSA is in the northern part of the Tendoy Range, a north to south trending range. Pardee (1950, p. 377) estimates that displacement along the range front fault may be as great as 3,000 feet. He says that it may have resulted from movements that began in the Pliocene or earlier and that the mountains are of late Paleozoic sedimentary rocks, metamorphic rocks, and some Mesozoic strata.

Rock Units

Rock units from Precambrian through Mesozoic are present in this WSA.

Geologic Structure

Like the other WSAs discussed in this report, this unit lies in the Overthrust Belt. A low-angle thrust fault, the Limekiln Thrust, is within the WSA. It may be a branch of the Medicine Lodge fault to the south. Displacement along its course is to the northeast. The Geologic Sketch of the Northern Tendoy Mountains shows the complex structure of the area.

The straight, steep slopes and parallel northwest trends of the Tendoy Range are the results of major post-Laramide block faults.

Known Mineral Deposits

Locatable Minerals. Radioactive minerals have been reported in the southwestern portion of the WSA and just outside the southern and western boundaries (USDI, GS 1953). Mineralization occurs in pegmatite dikes. Radioactivity is caused by thorium and minor amounts of uranium. Some rare earths are present in some of the prospects.

The Grey Goose claims are located in sections 21 and 22, T11S, R11W, within the WSA. Samples from these claims contained about 0.1% thoria and .002% uranium.

Several lime kilns were once in operation in Limekiln Canyon, but they were abandoned many years ago.

Leasable Materials. The following information was taken from the 1974 GS report on the mineral potential for the Tendoy Mountains.

Lignite beds up to 5 feet thick in Section 35, T11S, R12W, have been mined on a small scale in the past. This lignite-bearing formation is present beneath much of the Tendoy area; however, the lignite generally has a high ash content and is considered to be of little value.

Mining Claims, Leases, and Permits

Three unpatented mining claims have been recorded with the BLM within or just outside of this WSA.

There are six oil and gas leases in this area (see the Bell-Limekiln Mining Claims and Mineral Leases map). Four were issued before the passage of FLPMA, so they do not carry the wilderness protection stipulation. The other two do.

Conoco Inc. has an application for a permit to drill in the SW1/4NW1/4 of Section 23, T11S, R11W and also plans another wildcat well just outside the unit.

Mineral Resource Potential

Good potential for oil and gas in this WSA is indicated by GS reports and by the fact that both source and reservoir rocks are found in the unit. Conoco's interest in drilling a well in the unit also may indicate good potential for oil and gas.

The unit has limited potential for coal. There also may be potential for uranium and thorium, since there are occurrences of these minerals in the WSA; however, development is uneconomical at this time. There may be potential for lime and silica, since the rocks are exposed in the WSA. A sampling program would be needed to determine the feasibility of development.

Livestock Grazing

The Bell-Limekiln WSA has parts of five allotments within its boundaries. AMPs are proposed for all of these allotments. All of the WSA is leased for grazing.

The Radio-TV Allotment (0149) contains 1,832 acres; 440 acres (24%) are inside the WSA boundaries. Cattle graze here from mid-August to mid-November for a total of 388 AUMs, 153 of which are within the WSA. Projected AUMs in 2010 is 423. The proposed grazing system is deferred rotation. A fence approximately 1.5 miles long separates this allotment from the Roe Ranch Allotment. There is also about 0.75 mile of pipeline in the WSA that takes water to a location outside the boundary. No new range improvements are proposed under this AMP.

The Hansen East Side Allotment (0044) contains 8,048 acres. Approximately 1,180 acres (15%) are inside WSA boundaries. The allotment is used by sheep from April 1 to July 1 and from November 1 to February 1, on a rest-rotation system, for a total of 1,201 AUMs. Of these, 91 are within the WSA. The projection for 2010 is 1,324 AUMs under the AMP. There are no range improvements in the part of the allotment in the WSA, and none are proposed for that area.

The Medicine Lodge Allotment (0748) contains 10,646 acres; 1,960 acres (18%) are inside WSA boundaries. Cattle use the allotment from mid-May through October for a total of 1,880 AUMs on a rest-rotation system. The projection for 2010 is 2,312 AUMs. The number of AUMs within the WSA is 412. A prescribed burn is proposed for improving range conditions on about 400 acres within the WSA.

The Roe Ranch Allotment (0727) contains 8,134 acres; 2,860 acres are inside WSA boundaries. The total number of AUMs available is 1,413; however, the

present use by cattle is 1,330 AUMs from July through January on a rest-rotation system. The number of AUMs in the WSA is 375. When the AMP is implemented, use of more than 1,330 AUMs will be allowed. The number of AUMs projected under the AMP for 2010 is 1,723. Range improvements proposed within the WSA are 1 mile of fence, 1 mile of pipeline, and one artificial watershed.

The Bell Canyon Allotment (0193) contains 7,941 acres; 3,140 acres are within WSA boundaries. The allotment is used by cattle from June through September on a deferred and deferred rotation system. The total number of AUMs is 1,167; projected AUMs for 2010 is 1,295. A total of 156 AUMs are within the WSA. A fence about 0.25 mile long is proposed within the WSA.

For each of these allotments motorized equipment may be needed for construction and occasional major maintenance of range improvements.

Timber Management

The WSA contains approximately 1,661 acres of forestland. Of this, 914 acres (55%) are on slopes suitable for cable yarding; 747 acres (45%) are on slopes suitable for tractor logging.

EAUs for this WSA are evaluated in Table 12. Appendix C describes the assumptions used in the BLM timber analysis.

TABLE 12
PRESENT NET WORTH OF TIMBER:
BELL AND LIMEKILN CANYONS WSA

	Economic Analysis Unit (EAU)	
	1	2
Present timber acreage[1]	682	65
Miles of road	10.3	4.0
At 4% discount rate		
Present value of timber	$43,442	$1,180
Road costs	157,456	16,474
Present net worth	-$114,014	-$15,294
At 7-3/8% discount rate		
Present value of timber	$4,820	-$547
Road costs	126,324	4,798
Present net worth	-$121,504	-$5,345

[1]After timber production capability class (TPCC) reductions (see Appendix C).

HENNEBERRY RIDGE WSA (MT-076-028)

The Henneberry Ridge WSA, which contains 9,807 acres, is about 12 miles southwest of Dillon, Montana, about 5 miles north of Clark Canyon Reservoir, and just south of the historic town of Bannack. It is roughly rectangular, about 6 miles long from northwest to southeast, and from 1 to 4 miles wide.

More than half the unit's boundary is formed by the boundaries of state and private land; there are intrusions of state land on the southeast and southwest. Identifiable features—Grasshopper Creek, a power line, vehicle ways, and fence lines—form a little less than half the boundary.

The unit is characterized by open, well-dissected prairie immediately south of Grasshopper Creek. Higher ridges on the south and west are partially timbered with Douglas-fir and limber pine.

The unit contains parts of two major drainages and most of Madigan Gulch, which runs from south to north through the center of the WSA. Other features, from south to north, are (1) a part of a high, broad basin, (2) a partially timbered limestone ridge, and (3) steep slopes leading to a bench in the central part of the unit. A relatively undefined ridgeline hides the bench from the area to the north, and there is a maze of small peaks, ridges, and drainages that lead north toward Grasshopper Creek. The trend of these features is roughly from southeast to northwest along the main axis of the unit.

There are higher, timbered ridges and slopes in the west end of the WSA. This part of the unit also contains most of two major tributaries of Madigan Gulch.

Public access to this WSA is from a BLM road that forms part of the southeastern boundary.

Wilderness

Quality of the Wilderness Resource

Naturalness. The unit contains just less than 11 miles of vehicle ways, short sections of gap fence, and three developed springs. The impact on naturalness is low for all of these except one section of vehicle way about 0.5 mile long and an associated spring development at the southwest edge of the unit. The impact of those two features is moderate.

Looking down from timbered ridge into the center of the unit.

All evidence of human occupation is within about 0.5 mile of the unit boundary except vehicle ways I and II. These two ways, which appear to have been used to distribute salt to livestock, are indistinguishable in many places, so their impact is very light.

The core of the unit appears very natural; the naturalness of the unit as a whole is one of its most outstanding characteristics. Table 13 details the impacts on naturalness which are shown on the Developments and Allotments map.

Outstanding Opportunities. A thumb of state-owned land intrudes into the unit on the southwest, narrowing its width to 1 mile. An irregular boundary on the southeast also results from state ownership. The thumb of state land at the southwest (T8S, R11W, Sections 29 and 32) more or less isolates the part of the unit west of Madigan Gulch, cutting off routes of travel in the gulch and along the timbered limestone ridge at the south end of the unit. This makes the core of the WSA relatively small, about 6,000 acres in a rectangular configuration.

The core-to-perimeter air distance is about 1.7 miles, but topography makes travel difficult; the actual core-to-perimeter travel distance is greater.

Topographic relief varies from 5,500 feet to almost 7,300 feet, and there is good local relief. Terrain is rolling in about 30% of the unit and well dissected in the rest. There are essentially no barriers to travel.

The unit contains about 15% timber, 10% tall shrubs, and 75% low shrubs or grassland. Screening by vegetation is available only in the southern and western parts of the unit.

The broken topography of most of the unit offers excellent opportunities for solitude for an area of this size, and the potential for dispersion and mobility of visitors is high. External influences are minimal; they consist mainly of distant views of undeveloped lands outside the unit, as far as Timber Ridge on the south, and as far as two miles north of Grasshopper Creek on the north where a high ridge blocks further visibility. None of these views has a significant impact. However, the power line that forms a part of the eastern boundary is visible and relatively noticeable from about 200 acres in the extreme southeast corner of the WSA.

The major attraction for visitors probably would be the high ridges on the south and west, where scenic values are high. This attraction could create a relatively low potential for a travel corridor. The relatively small size of

TABLE 13
EFFECTS ON NATURALNESS
HENNEBERRY RIDGE WILDERNESS STUDY AREA (MT-076-028)

Feature	Legal Location	Location within Unit	Length/ Area	Overall Impact	Remarks
Vehicle Way I and spurs	T8S, R11W, Secs. 27, 28, 34, 35; T9S, R11W, Secs. 1, 2, 12; spur in Sec. 1; T8S, R10W, spur in Sec. 31	Vehicle way on central bench runs from southeast edge through central part of unit.	5.5 miles	Low	Many parts of this vehicle way are very faint.
Vehicle Way II	T8S, R11W, Secs. 22, 27	Runs mostly up drainage, north edge of unit to center	2.0 miles	Low	Extremely faint.
Vehicle Way III and spur	T8S, R11W, Sec. 33	From south edge of unit to limestone ridge	0.8 mile	Low	Extremely faint.
Vehicle Way IV (system)	T9S, R11W, Secs. 1, 2, 11	In southwest corner of unit, on ridge	2.0 miles	Low	Fairly well defined, but not visible from large area.
Vehicle Way V	T8S, R11W, Sec. 20	Access to spring development #2 in southwest corner of unit	0.5 mile	Moderate	Well-traveled route.
Gap fence	T9S, R11W, Secs. 11, 12	Southeast edge of unit	1.5 miles	Very low	Sections of gap fence remain. Blends well.
Spring #1	T9S, R11W, Sec. 1	Southeast part of unit, in drainage at corner of state section.	Less than 1.0 acre	Low	Hidden in drainage near Vehicle Way I. Some livestock damage near drainage.
Spring #2	T8S, R11W, Sec. 20, NE1/4SE1/4	Southwest edge of unit	4.0 acres	Moderate	Fairly well hidden in drainage at end of Vehicle Way V. Heavy grazing impact.
Spring #3	T8S, R11W, Sec. 20, SE1/4SE1/4	Southwest edge of unit	1.0 acre	Low	Hidden in drainage.
Reservoir	T8S, R11W, Sec. 34, SW1/4SW1/4	South edge of unit	Less than 1.0 acre	Low	Small pond hidden in drainage.

the unit, relative lack of vegetative screening, and configuration problems in the southwest are factors that could adversely affect opportunities for solitude.

Opportunities for primitive recreation were not found to be outstanding in the intensive inventory analysis. The main attractions would be year-round cross-country hiking and horseback riding, and seasonal hunting for antelope and mule deer. Scenery from the higher ridges is attractive, and the topographic diversity is outstanding for an area of this size.

The unit's size and the lack of surface water would limit visits to short visits or brief overnight stays. Travel in the core of the unit, with its maze of ridges and drainages, is moderately challenging. Opportunities are neither very diverse nor particularly outstanding, but recreation opportunities are generally scarce in natural-appearing grassland types.

Special Features. The WSA provides important year-round habitat for mule deer and good to excellent antelope habitat. There is some elk winter range in the WSA. Scenic values, particularly scenic erosional remnants of paleozoic sedimentary rocks, along the southern and western ridges are a moderately important special feature.

Summary of Wilderness Quality. The chief wilderness characteristics of this unit are its natural character; the broken topography that enhances opportunities for solitude; its general diversity, including a natural-appearing block of open grassland; and the scenic view from the ridgeline.

The relatively small size and the irregular configuration on the west and east detract somewhat from the wilderness characteristics of the WSA.

Ecosystem Representation

Most of the WSA lies in the sagebrush steppe ecosystem. There are small amounts of the Douglas-fir forest and foothills prairie ecotypes. See Appendix E and the Ecotype map.

Manageability

Slightly more than half the unit's boundaries are along legal divisions that are not readily identifiable. There are major ridgelines just inside the boundaries of parts of the south and west portions of the unit that could serve as manageable boundaries.

There are barriers that would prevent vehicle travel to the center of the WSA except in the southwest part of the unit and, to some extent, the south central part. Vehicle travel is possible up the dry gulch in the north central portion.

The configuration of the core of the unit would not impede manageability, but the landownership pattern along the west side makes the configuration of the unit as a whole somewhat poor. It is also relatively poor in the southeast and along the east side, where state-owned Section 36, T8S, R11W, protrudes into the unit, isolating a narrow strip of land on the northeast from the rest of the WSA. Another problem of manageability is caused by the predominance of pre-FLPMA oil and gas leases, under which activity cannot be regulated by wilderness concerns.

Opportunities and Objectives

Improving Wilderness Quality. Vehicle ways I, II, and III would revegetate to the point of being almost completely unnoticeable if traffic was restricted. Vehicle ways IV and V would substantially revegetate, but some impacts caused by compaction or thin soils would be likely to remain. Way IV apparently is used in livestock operations; its impact could be reduced if vehicle traffic was limited or prohibited.

Livestock damage in the drainages around springs 1 and 2 could be reduced if fences were constructed to leave the troughs accessible but protect the spring sources and the drainages leading to the troughs.

Improving Manageability. Although there are no current offsite activities that substantially affect the unit, it would be possible to eliminate views of other undeveloped lands by moving the western and southern boundaries to follow ridges inside the present boundaries. However, such an adjustment on the south would exclude the higher open slopes and basin that provide diversity in the unit.

A possible adjustment to improve configuration on the northeast would be to eliminate the part of the WSA in Sections 30 and 31, T8S, R10W, or, alternatively, to acquire Section 36, T8S, R11W, now owned by the state.

Moving the unit's western boundary to Madigan Gulch would eliminate the configuration problems on the west, but it would also remove a large part of the unit as well as much of its diversity and some of its most appealing scenery.

Recreation

Recreation opportunities in the WSA are limited in both quality and quantity. The primary activities are mule deer and antelope hunting and some upland game bird hunting, which generally involve some motorized use. Estimates are not available on use, but it is considered extremely light.

Opportunities for motorized recreation are limited—essentially to existing vehicle ways and to a few potential cross-country routes on the central bench.

Wildlife

Elk use the WSA during various times of the year. The MDFWP has identified a winter population of approximately 160. The WSA includes a small percentage of the winter range for elk in this area. Madigan Gulch is especially important as elk winter range. This unit also provides important year-round and winter habitat for mule deer, and spring-summer-fall range for pronghorn antelope. Some winter range for antelope is also available, primarily in the lower sagebrush foothills and benches.

Geology and Minerals

Geologic Setting

The area is characterized by northwest folds and faults. Henneberry Ridge, a prominent feature along the southwest boundary of the unit, consists of numerous relatively thin lower Paleozoic formations. There is a fairly continuous Paleozoic section to the northnortheast that leads to a mantle of Tertiary volcanics.

The most important geological area relating to mineral production is the northwestern end of the unit. The northern boundary is within a mile of the town of Bannack and adjoins a number of patented mining claims that had significant gold production. The gold production is related to a Tertiary granodiorite intrusive stock and to mineralization in the adjoining limestone. The WSA boundary excludes the stock, but not necessarily all of the intruded limestone. Grasshopper Creek, which was the scene of one of the first placer gold developments in the state of Montana, forms part of the northern boundary (see the Geologic Map of the Bannack-Grayling Area.)

Geologic Structure

A fairly recent report, "Geologic Map of the Bannack-Grayling Area: Beaverhead County, Montana" (USDI, GS 1965) is quite explicit about the area's geology. It describes the stratigraphy, structure, and metallic and nonmetallic ore deposits of the area. This section summarizes that paper and adds more recent information about the unit.

The oldest exposed rocks in the unit are a Precambrian gneiss-schist.

The tectonic history of the area includes deformation of the Precambrian crystalline rocks, with igneous activity and extensive erosion. The Belt Series is absent. Folding and faulting were indicated during mid-Cambrian time.

The Laramide Orogeny began with gentle folding during late Cretaceous. By Eocene time, strong folds and thrust faults developed. Steep faults developed along the thrust plates. Early Tertiary was a time of numerous thrust faults and basalt-rhyolite flows. This probably

extended from Eocene to Oligocene time. Many older formations were thrust eastward over younger rocks.

The granodiorite stock containing the gold was intruded during early Tertiary. This stock was eroded and partially redeposited in Oligocene and Miocene conglomerates.

Known Mineral Deposits

Locatable Minerals. There is a highly mineralized area immediately north of the WSA, along the entire northern boundary, where rich deposits of gold occurred with the intrusion of the Bannack granodiorite stock. When this stock was partially eroded, mineral values were redistributed downstream in Grasshopper Creek. Shenon (Mont. Bur. Mines & Geol. 1931) says $10 million worth of gold came from the Bannack mining district, of which about $8 million was from placer deposits and the rest from lode deposits.

Dredges worked the entire length of Grasshopper Creek. Several patented lode claims share a common boundary with this unit. It is assumed that all the stream gravels and bench gravels have been worked, but it is possible that there could be a missed pocket.

The gold values in this area are attributed to the granodiorite stock. Some of the fluids associated with the intrusion penetrated the adjoining limestone formations, forming a contact metamorphic zone of enrichment. The gold deposits generally occur between the marbleized and silicate zones. Generally the contact zone carried the highest values.

There were extensive workings along the west side of the stock in Sections 7 and 8, T8S, R11W, where erosion has exposed the contact for several hundred feet. Many mines were opened on the north side of the stock, farther from the WSA. The rest of the contact zone, on the south and east, has not been carefully prospected, according to Lowell (USDI, GS 1965). Any gold values in that area could be inside WSA boundaries.

The Blue Wing mining district, 3 miles northeast of Bannack, has produced more than $2 million in silver. It is associated with another intrusive granodiorite stock. The ore is in the Madison Group limestone adjacent to the stock. Since the Madison Group limestone is also found in the WSA, it is possible that this mineralization could occur in Sections 7, 8, and 17, T8S, R11W.

Henneberry Ridge is an anticline in which the older formations in the center are exposed. On the north and south flanks there are deposits of the Permian Phosphoria Formation, which does not outcrop within the unit but is buried beneath the Quadrant Formation and the Tertiary andesite flows. Although the Phosphoria is not a phosphate producer locally, it is important for this purpose in other parts of Montana and in Idaho.

Leasable Materials. The WSA may have potential for oil and gas although there has been no specific interest in the Henneberry Ridge area. Potential for other leasable minerals appears to be limited.

Mining Claims, Leases, and Permits

All of the public land in this unit is leased for oil and gas, mostly under pre-FLPMA leases. There are no other mineral leases or permits on this land (see the Henneberry Ridge Mining Claims and Mineral Leases map).

Sixteen mining claims are in or adjacent to the WSA—four lode claims held by the Golden Ledge Exploration and Mining Company, which has other claims outside the boundary, and 12 placer claims of the Bon Accord Mining Company. The placer claims are all along Grasshopper Creek in T8S, R11W, Sections 21, 22, 23, and 24. They probably extend up the hillside from the stream bed. Most of the creek bed is already patented.

Mineral Resource Potential

The potential of this unit has not been fully explored. Some of the previously known ore bodies were cut by faults and were lost in the faulted area. It is possible that some of them are within the WSA. There is a high potential for gold mineralization in Sections 7, 8, 17, 18, and 19, T8S, R11W. This mineralized trend extends about 6 miles to the north-northeast, crossing two highly productive mineralized areas (see the Henneberry Ridge Mineral Potential map).

The banks along Grasshopper Creek for 100 vertical feet above the present stream bed have high potential for placer gold. The high values formerly produced came from bench gravels and the stream bed. Time has changed the erosion levels.

Small streaks in the limestone near Madigan Gulch were reported to contain 0.5 ounce of gold per ton and 2 ounces of silver per ton. There are no claims on this site. It was in in the northwest part of Section 21, T8S, R11W.

The Phosphoria Formation lies beneath part of the south and west boundaries of the WSA.

The geology of this unit is less favorable for oil and gas than that of several other parts of southwestern Montana.

Livestock Grazing

The WSA contains part of one allotment with an existing AMP and part of one allotment for which an AMP is proposed. The entire WSA is leased for grazing.

The Bannack Allotment (0015), which has an existing AMP, contains 10,741 acres; 920 acres (9%) are inside WSA boundaries. The total number of AUMs is 544; the projection for 2010 is 744 AUMs. A total of 53 AUMs is within the WSA.

Under the AMP, cattle grazing begins in April when range conditions permit. A four-pasture alternate rest

grazing system has been implemented. Only a part of one pasture is within the WSA; it is used every other year, primarily in May and June. There are no existing or proposed range improvements in the part of this allotment that is within the WSA.

The Rocky Hills Allotment (0148), for which an AMP is proposed, contains 16,931 acres; 8,790 acres are inside WSA boundaries. The total number of AUMs is 1,609; the projection for the year 2010 is 2,220 AUMs. A total of 729 AUMs is within the WSA.

The proposed AMP would divide the allotment into four pastures for an alternate rest grazing system, where cattle would graze from mid-May through October. Two of the four pastures would be within the WSA. Under the AMP, it is anticipated that 5,400 acres of the allotment in critical erosion condition will improve to at least moderate condition. There are two developed springs within the WSA, about 1.5 miles of fence separating two pastures, and one small reservoir just inside the southern boundary.

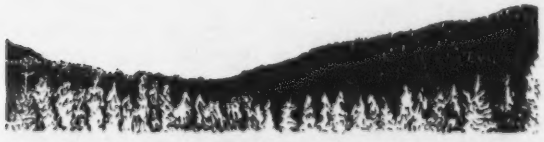
Improvements proposed within the WSA for this allotment are 3 more miles of fence to separate pastures, a well and windmill, nine troughs, and about 3 miles of pipeline to bring water from the windmill. About 100 acres of the WSA would be included in a proposed prescribed burn. Motorized equipment may be needed for construction, and on an occasional basis for major maintenance of range improvements.

Timber Management

The WSA contains 874 acres of forestland. Of this, 288 acres (33%) are on slopes of more than 70% and 586 acres (67%) are on slopes of less than 40%.

The entire north end of this WSA is on a steep slope that exceeds 70%. Most of the rest of the timber is on a talus hillside along the west side of the ridge. Inhibiting rock makes logging inoperable here. No further evaluation will be made of timber values in this unit.

FARLIN CREEK WSA (MT-076-034)



The Farlin Creek unit is 1,139 acres of BLM-managed land contiguous to the 93,859-acre East Pioneer proposed wilderness (FS RARE II area 1-008). This tack-on WSA is about 1.5 miles southeast of Polaris, Montana, on the western slope of the east leg of the Pioneer Mountains. It is partially within the historic Elkhorn and Baldy mining districts.

The unit's boundaries are all on legal subdivisions, with national forest lands adjoining the WSA on the east and forming part of the north and south boundaries. Private lands are on the north, west, and south; BLM-managed land forms a small part of the southern boundary.

Steel Creek and Farlin Creek dissect the unit, flowing west about a mile apart on either side of a ridge more than 7,000 feet high. The two forks of Farlin Creek, the larger stream, head on Baldy Mountain, about 3 miles upstream on Forest Service land.

Vegetation on the ridge between the creeks and on north-facing slopes is predominantly timber. There are aspen stands and meadows along the creeks. Parts of the western edge of the unit and the area north of Farlin Creek are open, sagebrush-grassland types.

There is no legal public access to the area.

Wilderness

Quality of the Wilderness Resource

Naturalness. Table 14 summarizes the human imprints present in this unit. See also the Developments and Allotments map. The chief imprints are a concentration of vehicle ways in the northern third of the unit, evidence of selective logging along Farlin Creek, and the remains of a mine and a vehicle way along Steel Creek.

The vehicle ways in the vicinity of Farlin Creek generally have low impact, but the impact of vehicle way I and nearby logging in the west half of Section 4 is moderate.

Another impact is evidence of heavy grazing, including large denuded areas along the stream banks, in the Farlin Creek bottom.

Overall, the unit is substantially natural-appearing except for an area along lower Farlin Creek.

Outstanding Opportunities. The WSA is a stairstep-shaped unit from 0.25 to 1.25 miles wide on the west edge of the irregular FS boundary. The forest cover in most of the unit and the well-dissected topography provide excellent potential for seclusion, especially when the unit is considered as part of the larger roadless area. The two major drainages and several smaller tributaries offer good potential for dispersal of visitors, and the potential for mobility is excellent.

Approximately 70% of the unit has forest cover; the remaining 30% is open foothills prairie or streamside meadow. Terrain in about 80% of the unit is well dissected; the rest is rolling. Elevations range from about 6,480 feet to about 7,760 feet, with significant local relief.

There are essentially no outside sights and sounds that affect the unit. The unit's topography generally funnels vision upslope toward the FS lands recommended for wilderness.

TABLE 14
EFFECTS ON NATURALNESS
FARLIN CREEK WILDERNESS STUDY AREA (MT-076-034)

Feature	Legal Location	Location within Unit	Length/ Area	Overall Impact	Remarks
Vehicle Way I & 2 spurs	T5S, R12W, Secs. 33, 34; T6S, R12W, Secs. 4, 5	Farlin Creek. The two spurs lead north from main way.	1.5 miles	Moderate	Fairly substantial impact west of creek crossing in W1/2, Sec. 4. Eastern spur extends up open ridge and is visible from south.
Vehicle Way II and spur	T6S, R12W, Sec. 4	South of Farlin Creek, up north-facing slope into timber.	1.0 mile	Low	Only part noticeable from any distance is on open slope south of Farlin Creek. Rest is through timber; some trees have been cut.
Vehicle Way III	T6S, R12W, Sec. 8	Steel Creek to high point north of creek	0.5 mile	Low	Access to mine and cabin remains.
Vehicle Way IV	T6S, R12W, Sec. 8	Saddle south of Steel Creek	Less than 0.25 mile	Low	Small part of 4WD trail extends into unit from south.
Mine	T6S, R12W, Sec. 8	Steel Creek	1.0 acre	Low to moderate	Mine, cabin remains, and prospect pits along Steel Creek way.
Logging evidence	T6S, R12W, Secs. 4, 5, and 8	Along Farlin Creek from WSA boundary to drainage junction, NE1/4NW1/4, Sec. 4. There are slash piles along vehicle way; scattered pole cutting in NE1/4 Sec. 8 and south part of Sec. 4.	Scattered over 100 acres	Low to moderate	Low in NE1/4, Sec. 8 and south part of Sec. 4. Moderate along Farlin Creek.
Developed spring	T6S, R12W, Sec. 33, SW1/4SE1/4	Open drainage along north edge.	Less than one acre	Low	Very small stock water development.

When considered with the FS unit, this WSA provides excellent opportunities for primitive recreation. Activities best suited to this WSA are hiking, backpacking, horseback riding, and hunting for elk, deer, and mountain grouse. As an access point or supplemental site, the unit contributes to other opportunities on national forest lands such as climbing, nature study, and mountain goat hunting.

Special Features. This unit provides important spring-summer-fall habitat for mule deer, important spring and fall elk range, elk calving habitat, and some winter range for deer and elk.

Scenic values are moderate in this small unit; however, as a tack-on to the FS unit, the area adds to the diversity of the total area by including lower foothills and drainages—a supplemental scenic value. It also adds to the larger area a timbered ridge more than 7,000 feet high, which is part of the system of forested ridges extending downslope from Baldy Mountain.

Summary of Wilderness Quality. As a tack-on to the FS unit, Farlin Creek WSA would add somewhat to the diversity and scenic quality of the part of the larger area that adjoins the BLM unit. Lower Farlin Creek contains some substantial human imprints, but the remainder of the unit is generally natural in appearance.

Ecosystem Representation

This WSA contains two major ecotypes: sagebrush steppe dominates the northern and western parts of the unit; Douglas-fir forest covers the rest. See Appendix E and the Ecotype map.

Manageability

This WSA is not manageable as wilderness on its own, but must be considered as a tack-on to the FS area.

As mentioned earlier, all unit boundaries are on legal subdivisions, which would be hard to identify on the ground. However, the Forest Service's adjacent East Pioneer unit is entirely delineated by legal subdivisions also, so there would be little benefit in establishing topographic boundaries for the Farlin Creek unit. The national forest boundary at Farlin Creek is irregular, and the BLM unit fits into this boundary from the west for a width of about 0.5 to 1 mile. While the western edge of the WSA has an irregular boundary, the body of this unit added to the larger area would result in a less irregular and presumably more manageable East Pioneer wilderness unit.

Vehicle ways extending up Steel and Farlin creeks are accessible to motor vehicles. The part of the unit north of Farlin Creek is open foothills, with few barriers to vehicle travel. Vehicle access south of Farlin Creek could be controlled by barriers where the existing ways enter the relatively dense coniferous forest.

There are no inholdings within the unit, and although there are parts of more than 20 unpatented claims in the unit, there are no mining claims on which a valid discovery has been made. Most of the claims are concentrated in the Steel Creek area. The entire area is leased for oil and gas; all of the leases were issued after the passage of FLPMA, so they carry the wilderness protection stipulation.

Opportunities and Objectives

Improving Wilderness Quality. Most of the vehicle ways in the unit, except for the way along lower Farlin Creek, are light imprints that would require a relatively short period to revegetate if traffic were restricted. The short length of two vehicle ways that pass through timber and the old logging areas would require somewhat longer to become relatively unnoticeable.

A boundary adjustment to exclude the Farlin Creek way as far as the creek crossing and the logging evidence along the creek would eliminate the major impacts in the unit. Another adjustment could exclude the lower Steel Creek way and the mine.

Grazing damage along Farlin Creek could be mitigated by management. This would greatly improve scenic quality and water quality.

Improving Manageability. Manageability concerns center on how the Farlin Creek WSA fits into the Forest Service's East Pioneer Unit as a tack-on. Considered as an addition to the entire FS unit of more than 93,000 acres, the Farlin Creek WSA would have an insignificant effect on the larger unit. However, considered as a tack-on to the adjacent portion of the FS unit, the Farlin Creek unit would have some effect. It would add the following qualities to this adjacent area:

Diversity—lower foothills would be added.

Physiographic unity and scenic quality—the tack-on would add the only timbered ridge extending west from Baldy Mountain that is not within the FS unit.

Access—A logical access route to the higher country around Baldy Mountain would be provided.

Manageability—There would be an opportunity to create a less irregular boundary for this portion of the larger roadless area.

Recreation—Supplemental recreation features and opportunities that would increase somewhat (but not significantly) the carrying capacity of this part of the larger unit would be added.

Addition of some or all of the WSA to the East Pioneer unit would moderately enhance the manageability of the section of the larger area that adjoins the BLM unit.

Central portion of unit with Baldy Mountain in the background.

Recreation

Because of this unit's limited size and its physiographic relationship to adjacent FS lands, most of the recreation opportunities it provides are supplemental to existing opportunities and values on the adjacent larger unit. Viewed from this perspective, the WSA provides above average to excellent opportunities for big game and grouse hunting, sightseeing, hiking, photography, camping, and backpacking.

Estimates are not available on the amount of use this unit receives, but it is relatively light, with most use occurring during the big game hunting season. Much of this use involves motor vehicle use of existing vehicle routes within the WSA.

Wildlife

The unit provides important spring and fall habitat for elk, and elk calving range. The unit has only minor amounts of elk winter range. Mule deer use the WSA only marginally in winter. However, the unit is important intermediate range for mule deer during spring, summer, and fall. The unit provides important yearlong habitat for blue grouse and ruffed grouse.

The fisheries values of Farlin Creek are unknown at this time.

Geology and Minerals

Geologic Setting

The unit lies on the west slope of the east leg of the Pioneer Mountains. The geology of this area has not been accurately mapped. The older rocks to the north appear to be a series of Cambrian sandstones, limestone, and shale. A recent geologic map indicates that this area is Mississippian Madison limestone and Pennsylvanian Quadrant quartzite. According to the mineralization reported in the developed mines, it would appear that the northern part of the unit is late Paleozoic rather than Cambrian.

The southern part of the WSA is predominantly Mississippian Madison limestone. The area to the east is the Tertiary-Cretaceous quartz monzonite, Pioneer batholith. This would have many of the same characteristics of the larger Boulder batholith to the north. The area to the west consists of Tertiary sedimentary deposits. There is abrupt contact between the formations, with several long, northwest-trending faults (see the General Geologic Map of the Polaris Area).

Geologic Structure

The geologic structure of the entire area is determined by the intrusion of the Boulder batholith. This is locally called the Pioneer intrusive. This intrusion penetrated the area by faulting, thrusting, assimilating material, and updoming in early Tertiary time. The batholith forms the core of most mountain ranges in southwestern Montana. Winchell (USDI, GS 1914) believes the intrusive is primarily a quartz monzonite. There are separate intrusions and extrusions that include granodiorite, andesite, basalt, pyroxenite, and other related igneous rocks. The principal mineralization for many mining districts of the area was near the contact with the igneous intrusive.

Known Mineral Deposits

The Polaris mining district is quite small in comparison to several other nearby districts. It is based on the Polaris Mine (Lost Cloud) and the Silver Star. These mines are a mile north of the WSA, but the mining claim complex extends into the WSA. The mineralization occurs along the contact between the batholith and the Paleozoic country rock. The contact zone is faulted, the main fault being the Polaris fault. The primary ore is silver, mostly found in tetrahedrite. The ore contained 35 ounces of silver per ton; and some fire assays ran as high as 57 ounces per ton.

The ore is found in east-west veins, normal to the structure. The highest values were in replacement veins in the Madison limestone. Some ore also occurred in veins in the quartz monzonite. In addition to the silver values, some limestone was mined to be used in the local smelter for processing the ore.

The quartz monzonite-limestone contact is an area of high mineralization. Several mines are evidence of the influence of the contact.

Many nearby mining districts, such as the Elkhorn, Dyce Creek, Argenta, and Birch Creek, are along the quartz monzonite-limestone contact. Two mines within a mile of the unit produced more than $400,000 worth of silver and associated minerals.

The Polaris mine produced $250,000 worth of silver before 1905; from 1905 to 1965 it produced $139,900 worth of ore, most of which was silver. There were minor amounts of gold, copper, lead, and zinc. Geach (Mont. Bur. Mines and Geol. 1972) shows a plan of the Polaris mines, a map of surface workings, and a yearly production schedule beginning in 1907.

Recent samples taken by a mining claimant from T6S, R12W, Section 8, NE1/4NW1/4, have shown values of 0.13 ounce of gold per ton and 1.19 ounces of silver per ton. Three other samples taken from the same group of claims inside the WSA contained 20, 14, and 8.75 ounces of silver per ton. Samples from the adjacent Fire Hole claim in the same quadrant, owned by another miner, showed values of 20 ounces of silver per ton.

Based on existing information, there is only limited potential for any of the leasable minerals.

There are no known salable minerals. Limestone was formerly produced for a smelter flux, but no smelters remain in the area.

Mining Claims, Leases, and Permits

There are two major groups of unpatented mining claims within the WSA, the H & H and the Polaris.

Oil and gas leases have been applied for on all of the lands in the unit (see the Farlin Creek Mining Claims and Mineral Leases map). There have been no material sales or free-use permits in this WSA.

Mineral Resource Potential

This unit has no known potential for coal, phosphate, or oil shale.

There are 24 unpatented claims or portions of claims in this unit, and there are mines within the WSA. The entire unit is highly mineralized and has a high potential for future silver production (see the Farlin Creek Mineral Potential map).

Livestock Grazing

The WSA contains about half of the Farlin Creek custodial allotment (0191). This allotment contains 1,790 acres; 1,139 acres (64%) are inside WSA boundaries. The present licensing is for 114 AUMs; surveyed grazing capacity is 93 AUMs, 75 of which are inside the WSA. The number of AUMs projected for the entire allotment in 2010 is also 114.

Cattle now graze on this allotment from June 16 to September 30. A proposed change would make the season May 15 to November 30.

There is one spring development within the WSA. No further developments are planned. Motorized equipment may be needed on an occasional basis for major maintenance of this development.

Timber Management

The WSA contains 612 acres of forestland. Of this, 490 acres (80%) are on slopes suitable for tractor logging and 122 acres (20%) are suitable for cable yarding.

The WSA is forested with old-growth stands of Douglas-fir and scattered lodgepole pine. An existing vehicle way that comes up the creek from Polaris makes the area easily accessible.

Two EAUs are evaluated in Table 15. Appendix C describes the assumptions used in the BLM economic analysis.

TABLE 15
PRESENT NET WORTH OF TIMBER: FARLIN CREEK WSA

	Economic Analysis Unit (EAU) 1	2
Present timber acreage[1]	518	80
Miles of road	2.4	0.4
At 4% discount rate		
Present value of timber	$37,585	$5,440
Road costs	9,884	1,647
Present net worth	$27,701	$3,793
At 7-3/8% discount rate		
Present value of timber	$666	$40
Road costs	2,879	480
Present net worth	-$2,213	-$440

[1]After timber production capability class (TPCC) reductions (see Appendix C).

AXOLOTL LAKES WSA (MT-076-069)

Axolotl Lakes WSA is at the north end of the Gravelly Range about 3 miles southeast of Virginia City, Montana. It is roughly rectangular, about 3 miles by 4 miles. The unit contains 7,804 acres. Elevations range from 7,200 feet at the north edge to more than 9,300 feet in the southwest corner. A county road going south from Virginia City leads to the WSA.

Except for a fraction of a mile on the north, where a boundary is formed by a county road, all boundaries of this WSA are on legal subdivisions. There are two inholdings—small patented mining claims totaling about 24 acres in the northwest corner of the unit in Sections 13 and 24, T7S, R3W.

This WSA is in the transition area between the high hills of the Gravelly Range and the lower, open foothills between the valleys of the Ruby and Madison rivers. The terrain and vegetation are unusually varied for so small an area. Open, rolling meadows with sagebrush and grasses predominate at the north end of the unit, with

Blue Lake in northern portion of unit.

aspen groves in some small drainages and basins. Farther south there is spruce, then mixed conifer forests with interspersed meadows. Whitebark pine, lodgepole pine, and some subalpine fir are found in the west and southwest parts of the unit, and there are also open grassland areas. The western portion has a dense forest canopy and several small perennial streams.

There are many small drainages and basins in the northern part of the WSA. The basins, of glacial origin, contain several pothole lakes. Most of the lakes are small, but Upper Axolotl Lake and Blue Lake are relatively large. The unique axolotl salamander, for which the area is named, inhabits Blue Lake. A ridge rising sharply from the lake basin dominates the scenery in the northeastern part of the unit.

In addition to the lakes area, the WSA contains a short stretch of Arasta Creek, upper Buffalo Creek, upper Bachelor Gulch, several eastern forks of Alder Gulch, and three upper, northwestern forks of Wigwam Creek.

Wilderness

Quality of the Wilderness Resource

Naturalness. The Axolotl Lakes WSA contains about 20 miles of vehicle ways and 16.5 miles of fence. Table 16 and the Developments and Allotments map detail the impacts on naturalness in this WSA.

A constructed vehicle route, the evidence of logging, and constructed spurs to prospect pits and mines are concentrated in the northwestern corner of the unit. The northeastern part, in the vicinity of Axolotl and Blue lakes, has a number of light vehicle ways; however, these are expected to revegetate almost completely because travel in the area is now restricted.

The stock driveway is a moderate linear impact extending north-south through the center of the unit. About 7 miles of vehicle ways are concentrated in the southeastern part of the WSA.

The concentration of human imprints in the northwestern and southeastern parts of the unit and the stock driveway through the center affect the unit's natural appearance. Because of the signs of human activity in this small WSA, its natural character is somewhat low.

Outstanding Opportunities. While this unit is rather small, its configuration is generally good except at the northern and eastern edges, where fingers of the WSA extend from the body of the unit, and at the western edge, where the boundary is irregular and there are two small inholdings. The core-to-perimeter distance is about 1.5 miles. Routes to the core vary in difficulty of travel, but the shortest feasible route would be about 2 miles long.

The unit's local relief enhances opportunities for solitude, especially in the western part. Terrain in about

TABLE 16
EFFECTS ON NATURALNESS
AXOLOTL LAKES WILDERNESS STUDY AREA (MT-076-069)

Feature	Legal Location	Location within Unit	Length/ Area	Overall Impact	Remarks
Vehicle Way I (stock driveway)	T7S, R2W, Secs. 7, 8, 17, 18, 19, 30, 31; T7S, R3W, Secs. 23, 24, 25	From north to south through center of unit	5.5 miles	Moderate	Entire stock driveway is denuded; some old selective timber cutting along way. Goes through center of unit; short spurs in T7S, R3W, Sec. 23.
Vehicle Way II (system)	T7S, R2W, Secs. 17, 18	Three routes linking stock driveway to Blue Lake, Blue Lake to upper Axolotl Lake system of vehicle ways	2.5 miles	Low	Very light two-wheel track, most of which would rehabilitate under travel restrictions. Two sections on steep slopes south of Axolotl would need long time to become unnoticeable.
Vehicle Way III (system)	T7S, R2W, Secs. 8, 17	System of vehicle ways around upper Axolotl Lake and north of lake	2.0 miles	Moderate	Noticeable around lake, especially section with sidehill cut, excavation for dam. Now closed; likely to rehabilitate substantially.
Vehicle Way IV	T7S, R2W, Sec. 18; T7S, R3W, Sec. 13	Loop vehicle way west of stock driveway. North part is access to Vehicle Way V.	2.0 miles	Low	Mainly two-wheel tracks. Some areas in north deeply rutted by heavy equipment. South part very rough, mostly unnoticeable.
Vehicle Way V and spurs	T7S, R3W, Sec. 13	Access to patented claims and Alder Gulch area, west part of unit	2.0 miles	Moderate to high	Substantially constructed and maintained on steep hillside through forest. Some timber cutting including two small clearcuts (about 1 acre). Several partly constructed spurs lead to prospect pits, mine tunnels on open hillsides to south.
Vehicle Way VI	T7S, R3W, Secs. 24, 25	Bachelor Gulch in west part of unit. Includes one spur to south.	1.0 mile	Low	Way goes up creek bottom, washed out by creek. Little evidence of use.
Vehicle Way VII	T7S, R2W, Secs. 29, 31, 32	Crosses Buffalo Creek at cabin, southeast part of unit	2.0 miles	Low	Mostly through timber; some cutting along route.
Vehicle Way VIII	T7S, R2W, Secs. 29, 30, 32	Southeast part of unit	2.0 miles	Low	Very faint. Mostly through open country.
Vehicle Way IX	T7S, R2W, Sec. 32	Southeast part of unit	1.0 mile	Low	Through timber and meadows.
Fences	Various locations	Central part of unit along driveway; southeast part of unit; area near lakes in northeast	16.5 miles	Low to moderate	Much of fence is fairly well screened by timber. Removal of about 2 miles is proposed.
Two cabin ruins	T7S, R2W, Secs. 30, 31	Along Buffalo Creek; in meadow above Bachelor Gulch	Less than 1.0 acre	Low	Both are on stock driveway.
Cairns	T7S, R2W, Secs. 19, 30	In open high plateau south of Blue Lake, in east central part of unit	Less than 1.0 acre	Low	On high points marking old sheep trailing route. Historic value?
Gold Mill Ruins	T7S, R3W, Sec. 13	Western part of unit	Less than 1.0 acre	Low	Ruins of large mill structure along Vehicle Way V. Historic value.
Repeater station	T7S, R3W, Sec. 26	On peak east of Baldy Mountain in southwest part of unit	Less than 1.0 acre	Low	Small log building, antenna apparently maintained by use of helicopter. No vehicle access.
Developed spring	T7S, R2W, Sec. 31	Southeast part of unit	Less than 1.0 acre	Low	Livestock water.

25% of the area is rolling and somewhat dissected; the rest is well-dissected. About half the unit is forested; the other half contains a variety of open country—rolling foothills and basins, steep south slopes, and high plateaus and peaks ranging from 8,300 to 9,300 feet in elevation.

The potential for dispersing visitors is excellent. Travel is relatively easy except where slopes are steep in the western part of the unit. Travel is feasible along the many small drainages, and water is readily available, which also helps disperse visitors. The lakes area in the north probably would be the greatest attraction, but the unit is diverse and scenic throughout.

The minimal external influences are views of undeveloped national forest lands from high points in the extreme south of the unit and occasional views of private lands from widely scattered points at the northern and eastern edges of the WSA.

Opportunities for solitude are very good for an area of this size, although the lack of coherent topographic or physiographic boundaries, especially on the south and east, limits the size of the area in which solitude may be found. The irregular boundaries severely limit the number of natural routes of travel, such as along drainages and ridges, that are entirely within the WSA. The unit's configuration also limits the opportunities somewhat in the northern and eastern fingers and along the western edge; however, the varied topography, frequent stands of timber, and interspersed meadows and open high country provide many secluded spots for visitors in much of the unit. The ease of travel and the good vegetative and topographic screening add to the opportunities for solitude.

Opportunities for primitive recreation are diverse and excellent. The terrain is ideal for horseback riding, cross-country hiking, and backpacking, and the scenery and varied habitats provide excellent opportunities for photography and nature study. Most of the unit offers excellent cross-country skiing and winter camping. Some lakes are stocked with cutthroat and rainbow trout, so they provide good fishing. Deer, antelope, elk, and raptor habitats offer good opportunities for wildlife observation, and hunting for elk, deer, moose, antelope, and grouse is available.

Special Features. This WSA is listed in the National Directory of Research Natural Areas. In 1972, a 1,520-acre area around the lakes was recommended as an "Outstanding Natural Area" by the BLM in the course of planning for the area, but no formal designation was ever made. The current Dillon MFP recommends the area be considered as an area of critical environmental concern (ACEC).

The axolotl, which is indigenous to the unit, is a unique, nonmetamorphosing form of the tiger salamander. It is listed as a species of interest or concern by the state of Montana and is of scientific and educational interest.

Cultural values associated with the unit are considered high. Prehistoric occupation, ceremonial sites, and mass game kill sites have been identified in a small sample of the area. Historic mine and mill sites are evident in the west end of the unit.

Scenic views of the surrounding mountain ranges are a moderate supplemental value. The unusually varied terrain and vegetation are significant scenic features.

The lake fisheries are important, although they are limited by lack of spawning habitat. There is a potential for the introduction of grayling. Wildlife features include spring-summer-fall range for antelope, elk, mule deer, and moose.

Summary of Wilderness Quality. The WSA contains very significant special features and offers excellent recreation opportunities associated with these features. However, the number of human imprints and the area's small effective size when configuration is considered are major limiting factors.

Ecosystem Representation

The two major ecosystems in this unit are Douglas-fir forest and foothills prairie. There are minor amounts of the sagebrush steppe and the alpine meadow/barren ecosystems. See Appendix E and the Ecotype map.

Manageability

The unit's configuration is generally good except for the eastern and northern fingers and the irregular western boundary, which is formed by the boundaries of patented mining claims. The two inholdings isolate a small piece of the unit on the western edge (T7S, R3W, parts of Section 13). There is a currently used access route to the two claims which crosses the northwestern part of the WSA. No need for a new access route is foreseeable, but the physical impact of the present route, as well as its use, poses a problem for wilderness management in this corner of the unit.

There are unpatented mining claims in most of the western part of the WSA and near Buffalo Creek in the southeast. None are validated claims. Most of the area is leased for oil and gas, but these are all post-FLPMA leases to which wilderness protection measures apply.

Opportunities and Objectives

Improving Wilderness Quality. A boundary adjustment on the northwest could eliminate the corner of the unit affected by mining-related impacts.

About two-thirds of the vehicle way mileage in the WSA could be expected to rehabilitate substantially if the area were completely closed to vehicle traffic.

Vehicle way V is heavily constructed and could not be expected to rehabilitate naturally. The stock driveway, vehicle way I, is deeply eroded and would probably not return to a natural condition, since the existing use would be allowed to continue.

Improving Manageability. Options for improving the manageability of this unit as wilderness are limited. Acquisition of the patented claims within the boundary would improve boundary configuration, but extensive mining impacts in and around these inholdings would limit their value as additions to the WSA.

Boundary adjustments to eliminate the northern and eastern fingers would improve configuration; however, the unit is small enough that any major boundary changes to topographic or other legal lines could reduce the area to an unmanageable size.

Recreation

This WSA offers excellent opportunities for sightseeing, fishing, camping, big game hunting, hiking, snowmobiling, and backpacking. It receives light use, an estimated 300 recreation visits annually.

Glacial pothole lakes provide good camping and fishing opportunities. A local snowmobile club uses the area for its activities.

Existing ORV travel restrictions limit vehicles to designated routes yearlong, but snowmobiles are permitted off designated routes from December 1 to June 15.

Wildlife

The Gravelly Mountain range, which includes the WSA, is excellent habitat for elk. The elk population of the area has increased during the past 20 years. The WSA also provides excellent spring-summer-fall range for mule deer.

A small population of moose inhabits the WSA, which provides desirable spring-summer-fall moose habitat.

Antelope, numbering about 110 head, make intensive summer-fall use of open aspect ridges in Sections 19, 20, 29, and 30. This high ridge and plateau area averages about 8,500 feet in elevation, and probably constitutes one of the higher elevation antelope habitats in southwestern Montana. Habitat quality is excellent.

Blue grouse, ruffed grouse, and spruce grouse frequent the WSA, with Blue grouse being the most common.

Golden eagles nest within the unit. Other raptors commonly seen are the red-tailed hawk, goshawk, sharp-shinned hawk, and marsh hawk.

The Axolotl Lakes provide excellent fishing. Since spawning habitat is limited, periodic stocking is required to sustain a viable fishery. The lakes have potential for grayling introduction. The axolotl salamander, which is listed by the MDFWP as a species of special interest or concern, is found in Blue Lake.

Geology and Minerals

Geologic Setting

The rock units underlying the WSA range in age from Precambrian to Recent. Precambrian metamorphic rocks and Paleozoic sedimentary rocks outcrop mainly in the western and extreme southern parts of the WSA. Tertiary lava flows overlie most of the eastern half of the unit; that is, the lakes area (see the Geologic Map of the Upper Alder Gulch Area).

Rock Units

Rocks varying in age from Precambrian to Tertiary are found within the WSA. The Precambrian rocks host virtually all the mineralization in the WSA.

Geologic Structure

Manske (1961) mapped two thrust faults that trend generally north-northeast through Sections 24, 25, and 36, T7S, R3W. The movement on these thrust faults has been from the west—the west plates were thrust over the eastern plate. These Cretaceous faults probably extend beneath the Tertiary basalt flows farther northeast.

The Geologic Map of Montana (Mont. Bur. Mines & Geol. 1955) indicates that the Paleozoic and Mesozoic sedimentary rocks are folded into a broad northeastward-plunging synclinal feature. The nose of the feature coincides with the WSA, but the structural details are largely hidden beneath an overlying blanket of basalt.

Known Mineral Deposits

Locatable Minerals. The western portion of this WSA, which forms part of the Alder Gulch drainage, is in the famous Virginia City mining district. Gold was discovered in Alder Gulch in 1863 and mining has occurred there ever since. It has been estimated that as much as $30 million in gold has been mined from Alder Gulch.

The old mining town of Summit sits less than 0.25 mile west of the western boundary of the unit. Many lode claims in the Summit area produced several hundred thousand dollars worth of gold each.

The Kearsarge mine just south of Summit, at an elevation of about 7,300 feet, and just outside the WSA boundary, was one of the largest producers in the area. The Kearsarge vein occurs in gneiss and schist and strikes north 23 degrees east and dips about 65 degrees northwest.

Another major mine in the Summit area was the Oro Cache mine. It was discovered in 1864 on Spring Gulch about 0.5 mile from Summit (USDI, GS 1914). Its vein strikes north 10 degrees east and dips 65 degrees to 70 degrees west. This mine was reported to have produced about $500,000 in gold between 1864 and 1880.

The Nelson mine occurs in gneiss at an elevation of about 7,800 feet. The Nelson vein strikes east and dips 35 degrees south.

Many of the mining district's lode mines produced many more ounces of silver per ton than of gold.

Leasable Materials. No leasable minerals have been produced in this unit. According to the GS, the lands within the WSA are not valuable for oil and gas, coal, phosphate, or geothermal resources.

Mining Claims, Leases, and Permits

There are about 30 unpatented mining claims located by eight claimants in the western part of the unit. They are primarily in the area drained by Alder Gulch.

Most of the lands in this WSA are currently under lease or application to lease for oil and gas. All the leases were issued after the passage of FLPMA (see the Axolotl Mining Claims and Mineral Leases map). Current management direction provides for no surface occupancy on leasable minerals in the northeastern lakes portion of the WSA.

There is a withdrawal for public water reserves affecting portions of Sections 8, 17, and 18, T7S, R2W, in the lakes area. The area affected by this withdrawal is closed to all mineral entry.

No permits have been issued for salable minerals in this unit.

Mineral Resource Potential

These lands have a low mineral development potential for leasable commodities.

The potential for development of locatable minerals (gold) varies from low in the basalt outcropping areas (mainly the part of the WSA in T7S, R2W) to a moderate to high potential in the western portions. The ore veins of many of the early lode mines in the upper reaches of Alder Gulch trend into the western lands of the WSA. Mining claims largely blanket Sections 13, 14, 23, 24, and the north half of Section 26, T7S, R3W (see the Axolotl Mineral Potential map).

Livestock Grazing

The WSA contains parts of two allotments for which AMPs are proposed, part of one custodial allotment, and all of a second custodial allotment. Approximately 200 acres are currently not leased for grazing.

The Axolotl Lakes Allotment (0485) contains a total of 7,315 acres; 7,010 acres (96%) are within WSA boundaries. Four operators use this allotment for cattle grazing in the amount of 645 AUMs, 633 of which are within the WSA. Grazing season is July, August, and September on a deferred rotation system. The Mountain Foothills EIS projects that this allotment will have 729 AUMs by 2010 under the AMP.

Motor vehicles are used on existing vehicle ways for salting livestock and maintaining fence. About 15 miles of fence are inside the WSA; approximately 3 miles of this is slated for removal and 0.5 mile is to be reconstructed. Three spring developments also are within the WSA.

Developments proposed for this allotment are 3 miles of new fence and two spring developments with a total of 2 miles of pipeline.

The Davey Creek Allotment (0497) contains 5,832 acres; 220 acres (4%) are inside WSA boundaries. Two operators use this allotment for cattle and horse grazing in the amount of 318 AUMs, of which 13 are in the WSA. The grazing season is June through October on a rest-rotation system. The Mountain Foothills draft EIS projects that under the AMP there will be 359 AUMs by 2010.

Approximately 1 mile of boundary fence is within the WSA. Motor vehicles are used on existing vehicle ways for salting livestock and maintaining fence.

About 1 mile of additional boundary fence is needed. The part of this allotment that is within the WSA is probably not highly significant to the total operation; however, part of the boundary between this allotment and the Axolotl Lakes Allotment is inside the WSA.

Motorized equipment may be needed for construction of proposed developments and on an occasional basis thereafter for major maintenance and reconstruction of proposed and existing improvements on both of the above allotments.

The following custodial allotments are in this WSA:

	Acreage		AUMs		
Allotment Name and Number	Inside WSA	Total	Inside WSA	Total AUMs	Season of Use
Blue Lake (0473)	80	80	16	16	6/20 to 11/1
Belle (0672)	40	20	4	23	8/1 to 10/15

Timber Management

The WSA contains approximately 4,000 acres of forestland. Of this, 400 acres (10%) are on slopes of more than 70%. The acreage on slopes suitable for cable yarding is 2,400 (60%); 1,200 acres (30%) are on slopes suitable for tractor logging.

The steep, rugged western half of this unit can be reached through Alder Gulch. The well-timbered eastern half slopes gently to the east. If a vehicle way were developed from Alder Gulch, it could serve the entire unit. Existing vehicle ways from the northeast and the south are in poor shape and would require easements.

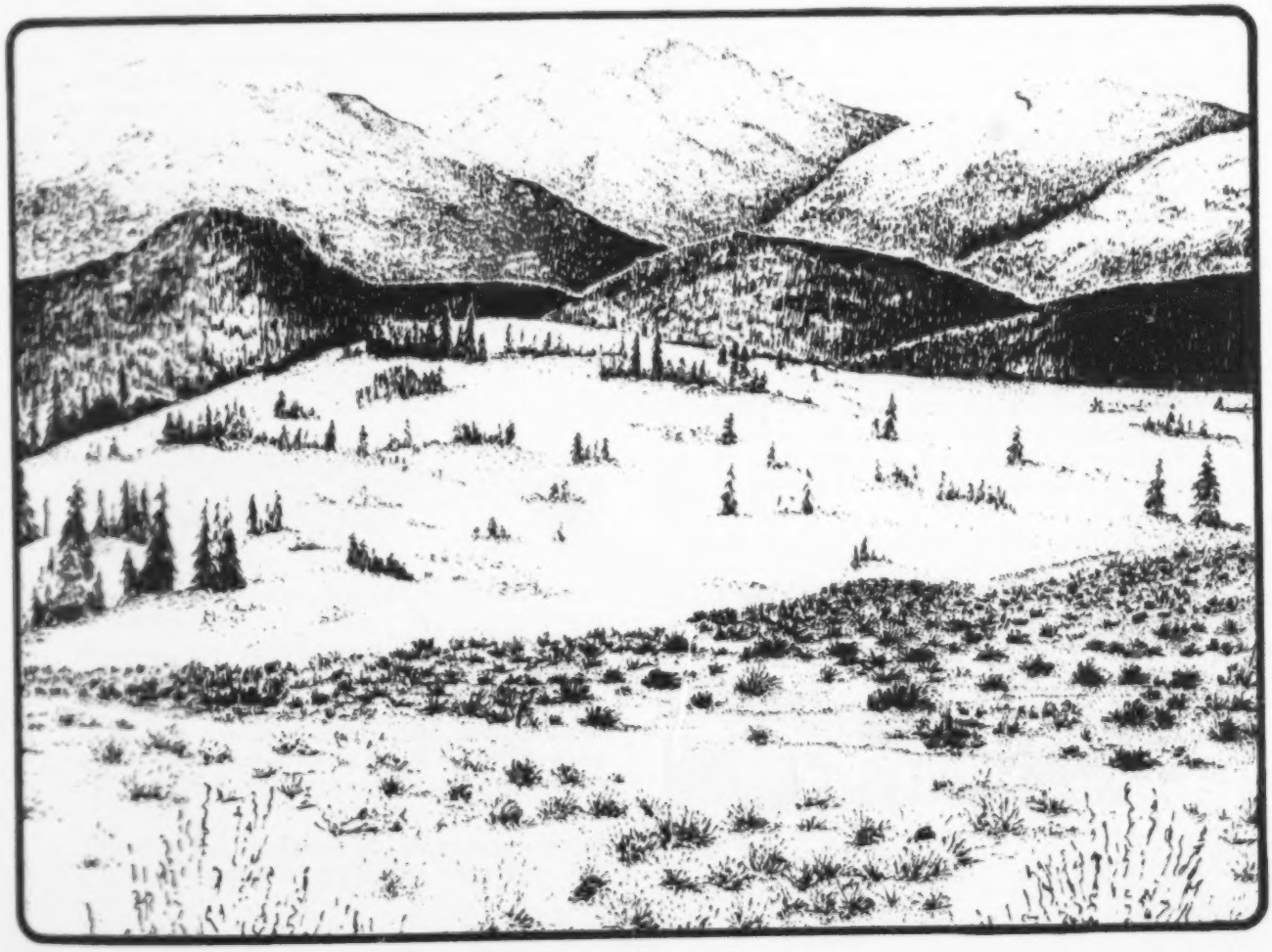
One EAU for this WSA is evaluated in Table 17. Appendix C describes the assumptions used in the BLM economic analysis.

TABLE 17
PRESENT NET WORTH OF TIMBER: AXOLOTL LAKES WSA

	Economic Analysis Unit (EAU)
	1
Present timber acreage[1]	3,303
Miles of road	15.1
At 4% discount rate	
Present value of timber	$626,746
Road costs	235,269
Present net worth	$391,477
At 7-3/8% discount rate	
Present value of timber	$202,470
Road costs	162,180
Present net worth	$40,290

[1]After timber production capability class (TPCC) reductions (see Appendix C).

Chapter 2
Alternatives, Including the Preferred Alternative



FORMULATION AND DESCRIPTION OF ALTERNATIVES

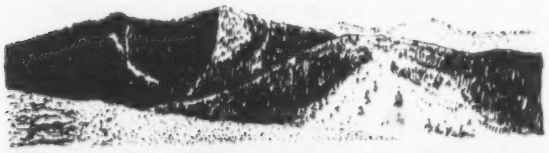
At least two alternatives were analyzed for each WSA: wilderness designation for the entire WSA, and no wilderness designation for any part of the WSA. In addition, each WSA was examined for the feasibility of analyzing an alternative that would recommend wilderness designation for part of the WSA.

Alternatives recommending partial wilderness designation were developed if it appeared that there would be opportunities to improve manageability or wilderness quality or to reduce resource conflicts. For some WSAs, it was not possible to develop a partial alternative that differed enough from the "all wilderness" alternative to warrant separate analysis; therefore, alternatives for partial wilderness designation were analyzed for only four WSAs.

In some cases nonpublic lands are completely or partially surrounded by the boundary of the WSA. In each of these cases the boundary of each alternative was drawn to exclude those lands; however, as the "Environmental Consequences" chapter explains, the acquisition of these nonpublic parcels would improve the manageability of the WSAs. If an area is recommended as wilderness, a possible option is to try to work out an exchange with the owners of these nonpublic parcels at a later date.

The alternatives described below are shown on the alternative maps found in the map supplement.

RUBY MOUNTAINS WSA (MT-076-001)



Three alternatives are considered for the Ruby Mountains WSA.

Alternative R-1, All Wilderness, recommends wilderness designation for the entire 26,611-acre WSA. The boundary, which is shown on the Alternatives map, follows the boundary between public and nonpublic land on all sides except in Section 34, T6S, R6W, where it follows the top of a prominent ridge for approximately 1/2 mile.

Alternative R-2, No Wilderness, recommends no wilderness designation for any portion of the WSA.

Alternative R-3, Partial Wilderness, recommends wilderness designation for 15,615 acres of the WSA. The boundary, which is shown on the Alternatives map, follows the boundary between public and nonpublic land on the west except that a protruding piece of land is excluded from wilderness consideration.

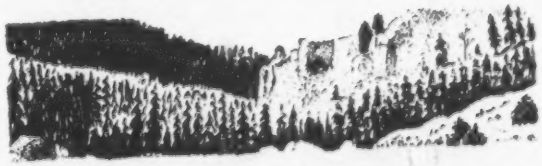
The northern boundary is the same as that of Alternative R-1.

Another small protrusion is omitted from wilderness consideration by the eastern boundary of this alternative; farther south, part of one section and all of another section also are excluded. The terrain in the latter exclusion is relatively flat; the adjacent land included in this alternative contains the mouth of a canyon and sloping hillsides. Still farther south, the eastern boundary excludes another half section from wilderness consideration.

The southern boundary of this alternative, which follows topographic and constructed features, removes from wilderness consideration the irregularly shaped southwest part of the unit and the area separated from the main part of the unit by the protruding finger of nonpublic land along the McHessor Creek road. Beginning at the west side of the unit, the boundary goes east-southeast along a prominent ridge above McHessor Creek to a high point, then follows a spur ridge south to another high point in the SW1/4 of Section 21.

From this high point the Alternative R-3 boundary follows a straight line essentially east for about a mile to a peak 8,438 feet high. Then it follows the top of the ridge southeast to the dividing line between Sections 22 and 27, running along the dividing line first east and then south until it rejoins the ridge. It follows the ridge southeast to a 7,759-foot peak; thereafter it follows a spur ridge northeast until it meets the original eastern boundary of the WSA.

BLACKTAIL MOUNTAINS WSA (MT-076-002)



Three alternatives are considered for the Blacktail Mountains WSA.

Alternative B-1, All Wilderness, recommends wilderness designation for 17,660 acres. The boundary, which is shown on the Alternatives map, follows the boundary between public and nonpublic land on the north, east, and south. The western boundary is formed by a road, the boundary between public and nonpublic land, and a fence.

Alternative B-2, No Wilderness, recommends no wilderness designation for any portion of the WSA.

Alternative B-3, Partial Wilderness, recommends wilderness designation for 10,975 acres of the WSA. The boundary, which is shown on the Alternatives map, is the same as that of Alternative B-1 except on the southeast, where it follows a ridge above Riley Canyon. This alternative eliminates from wilderness consideration the narrow, irregularly shaped southeast part of the original WSA that is included in Alternative B-1.

EAST FORK OF BLACKTAIL DEER CREEK WSA (MT-076-007)

Two alternatives are considered for this unit.

Alternative EF-1, All Wilderness, recommends wilderness designation for 6,240 acres. The boundary, which is shown on the Alternatives map, follows legal boundaries between BLM land and state, private and national forest lands except for a short distance where it follows the south edge of the road along the East Fork of Blacktail Deer Creek. Under this alternative, that road would be closed at the legal subdivision between Sections 27 and 28, T11S, R5W, and the road southeast of the closure would be included in the area designated wilderness.

Alternative EF-2, No Wilderness, recommends no wilderness designation for any portion of the WSA.

HIDDEN PASTURE CREEK WSA (MT-076-022)

Two alternatives are considered for this WSA.

Alternative HP-1, All Wilderness, recommends wilderness designation for the entire 15,509 acre WSA. The boundary, which is shown on the Alternatives map, follows legal boundaries between BLM lands and private, state, and Beaverhead National Forest lands except on the southeast, where it coincides with the northwest edge of the Sheep Creek road, and on the west, where parts of the boundary follow the east edge of the Muddy Creek road.

Alternative HP-2, No Wilderness, recommends no wilderness designation for any portion of the WSA.

BELL AND LIMEKILN CANYONS WSA (MT-076-026)

Two alternatives are considered for this WSA.

Alternative BL-1, All Wilderness, recommends wilderness designation for the entire 9,650 acre WSA. Most of the boundary, which is shown on the Alternatives map, follows legal boundaries between BLM land and private, state, or Beaverhead National Forest lands. The boundary in two places is drawn between BLM land found to lack wilderness characteristics and that found to have wilderness characteristics.

The western boundary from the radio tower at the north edge of the unit extends south along a prominent high ridge. Other parts of the boundary defined by topographic features are the north side of the westernmost protrusion of the unit, which follows the Kissock Canyon road from east to west, and the boundary of the southwest part of the unit, which follows the road leading south from Johnson Gulch to Deer Canyon. A part of the southern boundary follows the Deer Canyon road from west to east.

Alternative BL-2, No Wilderness, recommends no wilderness designation for any portion of the WSA.

HENNEBERRY RIDGE WSA (MT-076-028)

Three alternatives are considered for this WSA.

Alternative H-1, All Wilderness, recommends wilderness designation for the entire 9,807 acre WSA.

Much of the boundary of this alternative follows legal boundaries between BLM land and state or private land. Much of the northern boundary is formed by the private land boundary along Grasshopper Creek, and part of the western boundary is drawn along a fence line and two road segments. Part of the boundary on the southeast follows a road and a fence line, and part of the eastern boundary is formed by a power line.

Alternative H-2, No Wilderness, recommends no wilderness designation for any portion of the WSA.

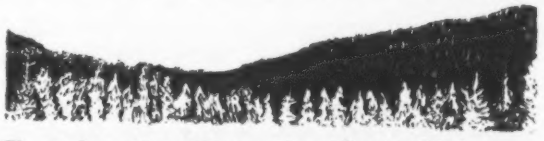
Alternative H-3, Partial Wilderness, recommends wilderness designation for 5,545 acres of the WSA. As shown on the Alternatives map, the western boundary of this alternative runs north along the legal dividing line between BLM land and the intruding thumb of state land. When the boundary reaches Madigan Gulch, it turns essentially northeast, following the gulch until it joins the original northern boundary of the WSA. The irregularly shaped western part of the original WSA is excluded from wilderness consideration under this alternative.

The northern boundary begins at Madigan Gulch, following the private land boundary along Grasshopper Creek east along the original WSA boundary until it reaches a ridge a short distance west of the original eastern boundary.

The eastern boundary follows the ridge south to the boundary between Sections 25 and 30, T8S, R11W. It then follows legal divisions between state and BLM land, leaving state-owned Section 36 outside the Alternative H-3 boundary. From the south edge of the state-owned section, it follows a prominent ridge southeast to a peak 6,461 feet high. From the peak, the boundary proceeds essentially south by line of sight to a prominent rocky point at 6,620 feet elevation, a short distance north of Henneberry Ridge. Again by line of sight, the boundary proceeds generally southwest to a peak 6,903 feet high on the original southern boundary of the WSA.

The southern boundary follows the original WSA boundary west on Henneberry Ridge road and continues along the road to a peak 6,916 feet high and beyond that to another peak 6,929 feet high near the legal boundary between Sections 2 and 3, T9S, R11W. From there it follows a fence north and then west, rejoining the ridge and continuing to another peak 6,560 feet high. It then turns generally north across a major drainage, reaching a peak at 6,579 feet elevation. From the peak it follows the top of a prominent ridge northwest to the original WSA boundary between state-owned and BLM land.

FARLIN CREEK WSA (MT-076-034)



Three alternatives are considered for this WSA.

Alternative F-1, All Wilderness, recommends wilderness designation for the entire 1,139 acre WSA. The boundary follows the legal boundary between BLM and private and national forest lands except where it crosses BLM land on a legal subdivision in the southwest part of the unit.

Alternative F-2, No Wilderness, recommends no wilderness designation for any portion of the WSA.

Alternative F-3, Partial Wilderness, recommends wilderness designation for 610 acres of the WSA to be added to the Forest Service's proposed East Pioneer area. The boundary, which is shown on the Alternatives map, extends south along the dividing line between Sections 33 and 34, T5S, R12W, from the national forest boundary to a point 200 feet south of Farlin Creek. It continues southwest and west along a line 200 feet south of Farlin Creek to the dividing line between Sections 4 and 5, T6S, R12W, then follows the legal line south until it rejoins the national forest boundary at the southwest corner of Section 4. This alternative removes from wilderness consideration the irregularly shaped western part of the tack-on unit.

AXOLOTL LAKES WSA (MT-076-069)

Two alternatives are considered for the study area.

Alternative AX-1, All Wilderness, recommends wilderness designation for the entire 7,804 acre WSA. The boundary, which is shown on the Alternatives map, follows legal boundaries between BLM lands and state, private, and Beaverhead National Forest lands except for a short section on the northern boundary that follows a county road.

Alternative AX-2, No Wilderness, recommends no wilderness designation for any portion of the WSA.

SELECTION OF PREFERRED ALTERNATIVES

The alternatives have been evaluated, and the preferred alternatives selected, on the basis of the planning criteria identified in the introductory section of this document. These criteria are also used to describe the cumulative impacts of each preferred alternative.

Public comment to date has been incorporated into the issues that guided data collection, and formulation and evaluation of alternatives. Public comments on the specific draft recommendations that follow will be analyzed fully and considered in formulating the final recommendations.

"Consistency with Other Plans" (criterion number 5) is addressed in Chapter 1. Available information shows no reference to specific areas under study here in any affected state, local or federal plan, although one local plan addresses wilderness in general. With publication of these draft recommendations, the BLM will solicit comments and consider and attempt to resolve any plan inconsistencies in preparing the final recommendations. However, the BLM cannot base its recommendations solely upon consistency with other approved plans.

Under "Impacts on Other Resources" (criterion number 6), watershed and cultural resources have not been addressed on an area-specific basis, primarily because projections about future use under nonwilderness management and the effects of these uses on watershed and cultural resources are difficult to make. However, as discussed in Chapter 3, wilderness designation would in general have a slightly beneficial effect on watershed and cultural resources.

Table 18 provides a summary of the preferred alternatives.

RUBY MOUNTAINS

The preferred alternative is Alternative R-3, Partial Wilderness. A total of 15,615 acres would be recommended for wilderness designation, and 10,996 acres would be recommended for nonwilderness. This alternative recommends wilderness protection for the area with the highest wilderness quality and minimizes both conflicts with other resources and manageability problems.

The ecosystem and habitat diversity under this alternative is substantially less than in Alternative R-1, but conflicts with timber, motorized recreation, access to private inholdings, and livestock grazing operations are also substantially reduced. Under the preferred alternative, most of the area grazed by livestock, most of the area suitable for motorized recreation, all of the positively valued timber, and the portion of the unit including two of the inholdings are recommended for nonwilderness. Most of the elk range included in wilderness under Alternative R-1 is recommended for nonwilderness under the preferred alternative.

One area with high potential for the occurrence of talc is included in the wilderness portion, but there are several other high potential areas to the south, both outside the WSA and in the nonwilderness portion of the WSA, that are more accessible and available for development.

The manageability of the area recommended as wilderness under the preferred alternative is considerably improved over Alternative R-1 because the preferred alternative establishes more regular boundaries, and eliminates the irregular southwest portion and two of the inholdings included in Alternative R-1.

The area recommended for wilderness would comprise primarily the rugged, forested north end of the Ruby range and consist primarily of the Douglas-fir forest ecosystem, with a limber pine subsystem of interest. The most challenging terrain with the best opportunities for solitude, significant mule deer range, significant cultural resources, and over 12,000 acres not grazed by livestock would be included in the proposed wilderness. Two inholdings—a section owned by the State of Montana and a patented mining claim—would be included within the boundaries. Acquisition of these parcels would aid manageability of the proposed wilderness.

There would be minimal effects on livestock grazing, as most of the proposed wilderness is not leased for grazing, and most of the area is inaccessible to vehicles. No timber considered technically possible and economic to harvest would be included. Security cover would be maintained for mule deer, but opportunities to increase forage would be forgone. A portion of the integral scenic vista from the Beaverhead and Ruby valleys would be maintained.

The wilderness characteristics in the south end of the range, the area recommended as nonwilderness, would likely be impaired by timber and/or mining activ-

TABLE 18
SUMMARY OF PREFERRED ALTERNATIVES

WSA No.	WSA Name	Acres Recommended As Suitable for Wilderness	Acres Recommended As Not Suitable for Wilderness
MT-076-001	Ruby Mountains	15,615	10,996
MT-076-002	Blacktail Mountains	10,986	6,674
MT-076-007	East Fork Blacktail Deer Creek	0	6,230
MT-076-022	Hidden Pasture	0	15,509
MT-076-026	Bell-Limekiln Canyons	0	9,650
MT-076-028	Henneberry Ridge	0	9,806
MT-076-034	Farlin Creek	610	529
MT-076-069	Axolotl Lakes	0	7,804
TOTAL		27,211	67,198

Looking towards Blue Mountain in the northern portion of the Blacktail Mountains WSA.

ity. A sustained timber harvest of one million board feet per decade would be available. This timber harvest would likely have detrimental effects on area elk populations.

BLACKTAIL MOUNTAINS

The preferred alternative is Alternative B-3, Partial Wilderness. A total of 10,986 acres are proposed for long-term wilderness protection, and the remainder of the WSA is proposed for nonwilderness. This alternative significantly improves manageability of the area as wilderness over Alternative B-I, and eliminates most of the only significant resource conflict, that with minerals, while recommending the area with the highest wilderness qualities for wilderness management. The major management concerns, the narrow and irregular southeast portion of the WSA and the concentration of mining claims in the Jake Canyon area, are eliminated under the preferred alternative.

The area recommended as wilderness can be managed to maintain wilderness quality over the long term. However, two sections owned by the State of Montana and 40 acres of private land protrude into the proposed wilderness, and acquisition of these lands will be considered to improve manageability and quality of the area. In both cases these lands comprise the heads of major canyons and a portion of the crest of the Blacktail range. The only potential conflict created by these acquisitions would be the use of a seasonal camp south of Ashbough Peak by a grazing permittee, and the associated use of motor vehicles. This use can be accommodated under the Wilderness Management Policy. However, if these lands are acquired, it is recommended that language be included in the enabling legislation to allow use of this camp and motorized access to it.

The proposed wilderness area would encompass the rugged north face of the Blacktail Mountains, approximately 8 miles of the crest of the range, and over 2,000 acres south of the crest in open, rolling terrain with a few pockets of timber. The area is relatively diverse, with viable examples of three ecotypes—Douglas-fir forest, alpine meadows and barren, and about 2,300 acres of the relatively underrepresented foothills prairie type. Spring-summer-fall big game range and suitable unoccupied habitat for bighorn sheep and peregrine falcon are included. Excellent opportunities for solitude and scientific values associated with the ungrazed north slope are also major wilderness qualities.

There would be few effects on mineral development, timber management opportunities, existing recreation opportunities, and livestock grazing operations in the proposed wilderness portion. Most of the area with the highest potential for gold, silver, and nickel near Jake Canyon is recommended for nonwilderness. There is some mineral potential in small, structurally controlled deposits along the Blacktail Fault at the north edge of the area recommended as wilderness. If any existing claims have a valid discovery prior to mineral withdrawal on the date of designation as wilderness or January 1, 1984, whichever is later, these claims could be developed. Otherwise the area could not be developed. There is no timber included in the proposed wilderness that is presently economic to harvest. Under wilderness designation, primitive recreation opportunities, visual resources, and important wildlife habitats would be given long-term protection. There would be relatively low additional operating costs to grazing permittees.

In the nonwilderness portion, there would probably be long-term adverse effects on primitive recreation, visual resources and big game winter range. The areas in the WSA with the highest mineral potential, the areas around Jake Canyon, could be developed with corresponding economic benefits.

EAST FORK OF BLACKTAIL DEER CREEK

The preferred alternative is Alternative EF-2, No Wilderness. While the WSA has excellent scenic values, big game habitat and primitive recreation opportunities, it is not considered to be manageable as wilderness. The major management concerns are the area's small size, irregular boundaries not corresponding to topographic features, existence of a road corridor within the body of the unit, and the uncertain long-term management of adjacent lands that are physiographically a part of the upper East Fork drainage. Closing the East Fork road as proposed under Alternative EF-I, All Wilderness, would improve manageability to some extent, but would also displace the major recreation use along the road. There were no other resource conflicts identified under the all wilderness alternative.

The area's wilderness qualities and special wildlife features can be substantially retained under nonwilderness management if current short-term management is continued. Currently, timber harvest is prohibited, and there are substantial restrictions on mineral devel-

opment and motorized vehicle travel. The East Fork is to be considered as an ACEC. Designation of the area as an ACEC, with an appropriate management plan, could provide more lasting protection than current management in the absence of wilderness designation. However, there is still a possibility of long-term degradation of wilderness values if management direction were to change.

HIDDEN PASTURE CREEK

The preferred alternative is Alternative HP-2, No Wilderness. The Hidden Pasture WSA is not considered manageable as wilderness due to pre-FLPMA oil and gas leases, poor configuration and irregular boundaries, a large number of range improvements requiring maintenance, and an inholding. The leases and poor configuration are the greatest impacts.

Wilderness designation would have only marginal benefits for the area's diverse and important wildlife habitats, its primary feature. Oil and gas activity would be minimally affected due to the nature of the leases, and would probably impact wildlife habitats. Recommendation of the area for nonwilderness does not represent a significant loss to the goals of quality and diversity in the national wilderness system, and wilderness values are not sufficiently high to offset the resource benefits that would be forgone. Existing motorized recreation and livestock grazing uses would be somewhat adversely affected by wilderness designation, and there would be relatively high additional grazing operating costs due to possible restrictions on the use of motorized equipment.

Under nonwilderness management, wildlife habitat needs and oil and gas exploration and/or production will at least partially conflict. At least in the short term, motorized recreation use will continue to be somewhat limited due to travel restrictions imposed to protect wildlife. Wildlife habitat, recreation opportunities, and visual resources will probably receive adverse effects from mineral uses, at least in the short term. In the long term, motorized recreation could receive some benefits. If oil and gas production takes place, there will likely be local economic benefits.

BELL AND LIMEKILN CANYONS

The preferred alternative is Alternative BL-2, No Wilderness. Although the WSA offers relatively high quality primitive recreation and scenic values and excellent mule deer range, it is not considered to be manageable as wilderness. Major management concerns are valid existing rights associated with pre-FLPMA oil and gas leases, the private inholding, and extremely poor configuration with irregular boundaries. Acquisition of the inholding would provide some improvement. However, the area's high oil and gas potential makes some impairment of wilderness values likely, whether the area is designated or not. In addition, there would be some adverse impacts to existing motorized recreation use and to grazing management and costs of livestock operations under wilderness designation, without substantial benefits to the wilderness resource or to important wildlife habitat.

There will likely be at least short-term adverse impacts to wildlife, scenic values, and all forms of recreation, but some local economic benefits due to oil and gas development, under the preferred alternative. Motorized recreation could receive some benefits over the long term.

Overall, the wilderness values are not sufficiently high to offset the other resource values that would be forgone.

HENNEBERRY RIDGE

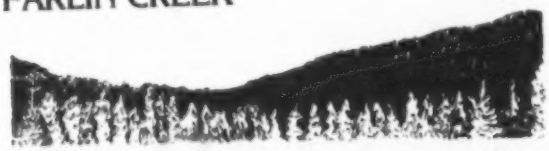
The preferred alternative is Alternative H-2, No Wilderness. The major factors considered in this recommendation are the relatively limited wilderness values, conflicts with livestock grazing management, and potential wilderness management problems associated with pre-FLPMA oil and gas leases. A complex of range improvements necessary to the implementation of the Rocky Hills AMP would be prohibited under both Alternatives H-1, All Wilderness, and H-3, Partial Wilderness. An increase of 611 AUMs per year and an opportunity to improve critical erosion condition while maintaining livestock grazing would be forgone. Although oil and gas potential is not high, any future development under the valid rights associated with the pre-FLPMA leases

would likely impair the area's primary wilderness value as a small example of a natural shrub steppe. This could occur under any of the alternatives. The area's wilderness values are not considered sufficient to offset the grazing management opportunities forgone and the manageability concerns.

Alternative H-3, Partial Wilderness, reduces resource conflicts compared to H-1, All Wilderness, by recommending for nonwilderness designation an area with gold and silver potential and an area proposed for prescribed burning, both of which would not be allowed under wilderness management. H-3 also provides more manageable boundaries. However, it would reduce significantly the size and diversity of the area recommended for wilderness, and the pre-FLPMA oil and gas leases and the conflict with livestock grazing would remain.

Under the preferred alternative, there would be adverse impacts on the WSA's natural character due to the concentration of range improvements and any future oil and gas activity. Mineral development could disrupt elk and deer movements and use patterns. The Rocky Hills AMP could be implemented, and the proposed burn could take place, with a long-term increase of 641 livestock AUMs per year and with probable improvement in the 5,400 acres of the allotment currently in critical erosion condition.

FARLIN CREEK



The preferred alternative is Alternative F-3, Partial Wilderness, which would recommend 610 acres for wilderness designation as a tack-on to the Forest Service's proposed East Pioneer Wilderness, and 529 acres for nonwilderness. This alternative adds the following values to the adjacent portion of the FS unit: physiographic/scenic unity and protection of scenic values, by including the timbered ridge extending west from Baldy Mountain; and, second, an opportunity to form a less irregular and therefore more manageable boundary for this part of the larger wilderness unit. The preferred alternative provides a logical wilderness access route to the Baldy Mountain area, and some supplemental wildlife and recreation features.

Compared to Alternative F-1, All Wilderness, Alternative F-3 reduces conflicts with minerals and motorized recreation, while eliminating the habitat diversity and most of the big game winter range that would be included under F-1. The preferred alternative recommends the area of high current mineral interest and mineral potential for nonwilderness. Such a designation would improve manageability. The most heavily traveled recreational vehicle routes, as well as the route to the Polaris claim group north of the WSA, is within the nonwilderness portion. A potential harvest of about 0.4 million board feet per decade would be forgone under both the preferred and the all wilderness alternatives. This forgone opportunity would represent forgone economic benefits, but mineral extraction in the nonwilderness portion would result in economic gains, as well as some adverse impacts to wildlife.

If the area recommended is ultimately designated as wilderness, a transfer of management authority from BLM to the FS is recommended so that only one agency is responsible for wilderness management. Given the very small proportion of the total unit that is currently managed by BLM, transfer of the BLM holdings is considered feasible and logical. If the FS unit is not ultimately designated, Farlin Creek would not be a viable independent candidate for wilderness status.

AXOLOTL LAKES

The preferred alternative is Alternative AX-2, No Wilderness. The wilderness alternative, AX-1, would assure long-term preservation of the area's scenic and primitive recreation values and significant special features, primarily wildlife habitat. However, naturalness is rather low, and manageability is affected by poor configuration and inholdings and mining claims in the western portion. Under wilderness designation, resource values forgone would be the relatively important motorized recreation use, full development of an area with high potential for gold, and long-term opportunities for a harvest of about two million board feet of timber per decade. In addition, there would be relatively high additional costs to livestock operations due to possible restrictions on the use of motor vehicles.

Under the preferred alternative, short-term management consists of restrictions on timber and minerals activity in a small portion of the WSA, and motorized travel restrictions to protect wildlife and watershed values. This management protects the special values in the lakes area, but would allow timber harvest and mining elsewhere. These activities would adversely affect wildlife, scenic, and primitive recreation values. Under the Dillon MFP, most of the WSA is to be considered as an ACEC for its wildlife, watershed and recreation values. Depending on the final decision and management plan, many of the area's special features could receive realtively long-term protection under nonwilderness management, with use of the area for motorized recreation continuing and some timber and mineral extraction possible.

REQUIREMENTS FOR AREAS RECOMMENDED AS SUITABLE FOR WILDERNESS DESIGNATION

Benefits

There are no major resource values or uses in conflict with wilderness preservation affecting the three areas recommended for wilderness. Relatively high wilderness values are sufficient to offset minor conflicts with minerals and additional costs of livestock operations in the Ruby Mountain and Blacktail Mountain areas. The benefits of adding the Farlin Creek unit to the NWPS are that it would add to the physiographic unity, scenic quality, and manageability of the adjacent portion of the proposed East Pioneer Wilderness. A potential timber harvest of 0.4 million board feet per decade is forgone in the Farlin Creek area, but about 3.8 million board feet per decade in other WSAs is released for timber management under the preferred alternatives.

Manageability

The only management concern in the areas recommended for wilderness in the Ruby Mountain and Blacktail Mountain WSAs are non-BLM lands within and protruding into the areas. These are recommended to be considered for acquisition. Involved are 640 acres of state lands and about 36 acres of private land in the Ruby area, and 1,280 acres of state land and 40 acres of private land in the Blacktail area. The 610-acre area in the Farlin Creek WSA proposed as wilderness is recommended for transfer of management authority to the FS for most logical and effective management.

PUBLIC COMMENT

Comments received to date, during the inventory phase and issue identification period of the study phase, have been used to formulate the issues that guided the analysis and draft decision process in this study. Formal hearings and a formal review period immediately following publication of this document will provide an opportunity for additional comments on the specific draft suitability recommendations. Public comments will be considered prior to formulating the final recommendations.

LOCAL SOCIAL AND ECONOMIC EFFECTS

Regional effects of the proposals are too small to measure. Local economic effects of the proposed actions are primarily restrictions to mineral development and timber development.

A specific economic effect of forgoing mineral development is not possible without information about their quality and quantity. This information is not presently available for these study areas. Before any of these areas are recommended to Congress as suitable for wilderness designation, the Bureau of Mines and the Geologic Survey will do a more detailed analysis of their mineral potential. The preferred alternatives have excluded from wilderness recommendations most of the areas with high mineral potential. Based on existing information, impacts on the local economy from restrictions on mineral development are unlikely to be significant.

Timber forgone in the proposed actions is 0.4 mmbf/decade in the Farlin Creek area. This amount of timber would result in forgoing about one-quarter of a job per year in all facets of logging and milling. At present, there are sufficient alternative sources of commercial timber in the local area to mitigate this loss. Specific analysis of the timber forgone can be found in the timber section in this chapter. About 3.8 mmbf/decade is released for harvest under the recommendations.

Some relatively small increases in livestock operations costs would be incurred in the areas recommended as suitable, as discussed in Chapter 3. Other social and economic effects are beneficial, related to long-term preservation of primitive recreation opportunities and important wildlife habitats.

ENERGY AND MINERAL RESOURCE VALUES

Five minerals listed on the National Defense Stockpile Inventory of Strategic and Critical Minerals, and energy resources of oil and gas, are relevant in the study. The supply goals referred to below are the goals established for national defense purposes.

Talc

One area which has geology associated with talc occurrence lies in the Ruby Mountain area recommended as suitable for wilderness. However, there are several other more accessible areas outside the WSA and in the portion of the WSA recommended for nonwilderness with the same geologic units. Given the current inventory, it is unlikely that designation of this area as wilderness will have an adverse impact on the strategic availability of talc.

Tungsten

There is some potential for tungsten in the Farlin Creek WSA. The area in the WSA that is well known as a mineralized zone (having existing claims and mines) is recommended for nonwilderness. There is unknown potential for tungsten in the area recommended as suitable for wilderness, but there are no claims or other specific indications of current interest. Given current stockpile levels, designation of this small area as wilderness is unlikely to have an adverse effect on the strategic availability of tungsten.

Nickel

The supply of nickel is currently less than the defense stockpile goal. One area in the portion of the Blacktail Mountains WSA recommended for nonwilderness has potential for nickel. Development of this irregular and low grade deposit is unlikely.

Silver

The inventory of silver is far in excess of the supply goal. One area of known silver potential in the Blacktail Mountains WSA has been allocated to nonwilderness. In the Farlin Creek WSA, the area with high silver potential that has received past and present mineral development interest has been recommended for nonwilderness. There remains potential in the area recommended as suitable for wilderness, but there are no claims and no known current interest in this small area. Based on this information, it is believed that designation as wilderness is unlikely to have any effect on strategic availability.

Thorium

There is some thorium potential in the Bell-Limekiln WSA, which is recommended as nonwilderness. Inventory of thorium is in excess of the supply goal.

Oil and Gas

Two WSAs, Hidden Pasture Creek and Bell-Limekiln Canyons, have relatively high potential for oil and gas. These areas are recommended as nonwilderness. None of the areas recommended for wilderness have significant oil and gas potential.

Other Minerals

Gold is the other major mineral of interest with good potential for occurrence in these WSAs. Areas in the Henneberry Ridge and Axolotl Lakes WSAs with high potential have been recommended for nonwilderness. In the Farlin Creek WSA, the area with the highest known potential and interest is recommended for nonwilderness, and an area with high potential for gold, but no past or present mineral activity or specific indications of interest, is recommended for wilderness.

An area with copper, silver, and barite potential in small, structurally controlled deposits is located on the north boundary of the area recommended for wilderness in the Blacktail Mountains WSA. If any existing claims have a valid discovery prior to mineral withdrawal on the date of designation as wilderness or January 1, 1984, whichever is later, these claims could be developed. Otherwise the area could not be developed.

CONSISTENCY WITH OTHER PLANS

Other local, state, and federal plans of specific significance to this study were examined at the beginning of the study process. These are discussed under "Consistency with Other Plans" under "Analysis of the Entire Resource Area" in Chapter 1. All affected agencies will be notified of the specific draft suitability recommendations and asked to document any inconsistencies during the formal review period.

IMPACTS ON OTHER RESOURCES

Livestock Grazing

Of the 27,211 acres recommended as suitable for wilderness, about 10,800 acres are grazed by domestic livestock for a total of 482 AUMs. In comparison, in the total area under study here, there are 77,300 acres leased for grazing for a total of 6,546 AUMs. There is no anticipated effect on stocking levels under the Wilderness Management Policy, and relatively low additional costs to livestock operators due to possible restrictions on motorized vehicles in each area recommended as suitable.

About 100 acres of the proposed 900-acre prescribed burn in the Ruby Mountains WSA are within the area recommended as suitable. The objective of lessening

impacts on riparian vegetation through better distribution of livestock can be met without this portion of the burn. There are no other proposed range improvements affected.

Timber

Three WSAs contain timber units that are technically harvestable and currently economic to harvest. Table 19 details these areas.

Of the total of 4.2 mmbf/decade, 3.8 mmbf with a present net worth (at 4%) of $412,939 is available for harvest under preferred alternatives. Harvest of 0.4 mmbf/decade with a net worth (at 4%) of $31,494 would be forgone.

Wildlife

Wilderness designation provides certain types of long-term protections for wildlife habitats, by restricting the use of motorized vehicles and development activities such as mining and timber harvesting. Exceptions to this would include mineral activities which have valid existing rights. Nonwilderness management may offer similar protection. However, in this situation, wildlife must compete on a more equal, trade-off basis with all other activities, and the types of long-term protections provided by wilderness are not guaranteed.

The wildlife habitats in Table 20 are within areas recommended as nonwilderness. Nonwilderness management has the potential to protect these habitats. Two WSAs recommended for nonwilderness are ACEC candidates. If these areas are ultimately designated as such, ACEC management could offer substantial protection. In two more areas, short-term protection is offered by existing motorized vehicle restrictions. However, in three of the areas, wilderness designation would not afford significant additional protection due to valid rights associated with pre-FLPMA oil and gas leases.

The habitats shown in Table 21 are within areas recommended as suitable for wilderness, and long-term preservation will be assured if the areas are designated.

Recreation

There will be little effect on motorized recreation under the preferred alternatives. Of the approximately 90 total miles of vehicle ways in the WSAs, about 82 miles are in areas recommended for nonwilderness, and about 8 miles are in areas recommended for wilderness. The current travel plan would be amended to change about 32,000 acres from limited to open designation, and the 27,211 acres recommended as wilderness would change from limited to closed designation. The remaining 35,000 acres will likely remain limited motorized use areas for protection of resources other than wilderness. After these changes, about 690,000 acres of the Dillon Resource Area (72%) will be open to motor vehicles with no restrictions.

If the areas recommended here—along with two former primitive areas recommended previously—are designated as wilderness, the total area closed by wilderness designation will represent about 16% of the restricted acreage in the resource area.

Of the WSAs and portions of WSAs recommended as nonsuitable, existing primitive recreation opportunities could be substantially protected in the East Fork and Axolotl Lakes areas, both of which have excellent opportunities. In the other six areas recommended for nonwilderness, primitive recreation opportunities will likely be diminished in the long term by other uses. Three of these areas, though, have less than outstanding opportunities.

Visual Resources

Preservation of scenic values is an important feature of each individual wilderness recommendation in this report. Part of the integral scenic vistas from the Beaverhead and Ruby valleys would be preserved by designation of the Ruby and Blacktail areas. The Baldy Mountain area scenic values would be preserved by designation of the Farlin area.

Of the areas recommended as nonwilderness, current management direction allows significant change in

TABLE 19
TIMBER VALUES AND SUITABILITY RECOMMENDATIONS

WSA	Potential Harvest (mmbf/decade)	Present Net Worth 4% Discount Rate	Present Net Worth 7-3/8% Dis. Rate	Suitability Recommendation for Timber Unit
Ruby Mountains	1.0	$21,463	$-24,502	Nonwilderness
Farlin Creek	0.4	$31,494	$-2,653	Wilderness
Axolotl Lakes	2.8	391,476	$40,290	Nonwilderness

TABLE 20

WILDLIFE HABITATS IN AREAS RECOMMENDED AS NONSUITABLE FOR WILDERNESS DESIGNATION

WSA Name	Important Habitats	Management Considerations
Ruby Mountains	Spring-summer-fall elk range and calving habitat.	None
Blacktail Mountains	Elk and deer winter range.	Vehicle restrictions currently in effect.
East Fork of Blacktail Deer Creek	Spring-summer-fall elk, deer, and moose range. Trout fishery.	Vehicle and other restrictions currently in effect. ACEC candidate.
Hidden Pasture Creek	Yearlong deer and antelope range. Spring-summer-fall elk range. Bighorn sheep reintroduction planned.	Vehicle restrictions currently in effect. Pre-FLPMA oil and gas leases.
Bell and Limekiln Canyons	Yearlong deer range and some yearlong elk range.	Pre-FLPMA oil and gas leases.
Henneberry Ridge	Yearlong elk, deer, and antelope range.	Pre-FLPMA oil and gas leases.
Farlin Creek	Elk and deer winter range.	None.
Axolotl Lakes	Spring-summer-fall elk, deer, and moose range. Summer-fall antelope range. Trout fishery. Axolotl salamander.	Vehicle and other restrictions currently in effect. ACEC candidate.

TABLE 21

WILDLIFE HABITATS IN AREAS RECOMMENDED AS SUITABLE FOR WILDERNESS DESIGNATION

WSA Name	Important Habitats
Ruby Mountains	Spring, summer, fall, and winter deer range.
Blacktail Mountains	Spring-summer-fall elk and deer range. Some elk calving habitat. Suitable unoccupied peregrine falcon and bighorn sheep habitat.
Farlin Creek	Spring-summer-fall elk and deer range.

visual resources (VRM Class IV) in three—Henneberry Ridge, Hidden Pasture and part of the Axolotl Lakes WSA.

Soil and Water Resources

Wilderness designation would have a slightly more beneficial effect on soil and water resources than would nonwilderness designation. Three areas with sensitive soil and water resources—East Fork, Hidden Pasture Creek, and Axolotl Lakes—are recommended for nonwilderness.

Cultural Resources

Wilderness designation would have a slightly more beneficial effect on cultural resources than would nonwilderness designation. There are high cultural resource values contained in three WSAs. One of these, the Ruby Mountains, is recommended for partial wilderness, while two, Hidden Pasture Creek and Axolotl Lakes, are recommended for nonwilderness. An area with moderate cultural resource value, Blacktail Mountains, is recommended for partial wilderness.

IMPACTS OF NONDESIGNATION ON WILDERNESS VALUES

Of the 67,198 acres recommended for nonwilderness in this study, about 11,670 acres in two areas will be considered for special management status as ACECs. Of the areas not recommended for wilderness, the East Fork unit (6,230 acres) can reasonably be expected to retain significant wilderness values. The wilderness value of the remaining areas will likely be at least somewhat impaired over the long term by timber harvest, mining, extensive range improvements, new roads, and oil and gas exploration and development.

EVALUATION OF WILDERNESS VALUES

The Ruby and Blacktail areas that are recommended as suitable offer excellent opportunities for solitude, challenging travel over rough terrain, high scenic quality, and significant wildlife features. The Blacktail area also has significant ecotype/habitat diversity, and the Ruby area has significant cultural values.

The values of the Farlin Creek area are related primarily to manageability and physiographic and scenic unity with the adjacent portion of the Forest Service area proposed as wilderness.

DIVERSITY IN THE NATIONAL WILDERNESS PRESERVATION SYSTEM

Ecosystems and Landforms

The ecosystems shown in Table 22 are represented in the areas recommended as wilderness. Acreages of each type are indicated.

Viable examples of the basic ecosystems are considered to be those 1,000 acres in size and larger. Viable representations are Douglas-fir forest and sagebrush steppe in the Ruby Mountains, and Douglas-fir, foothills prairie, and alpine meadows-barren in the Blacktail Mountains.

The representation of the relatively underrepresented foothills prairie type in the Blacktail area is considered a significant addition to the diversity of the wilderness system. The occurrence of this type at high elevation along the crest of the range is considered an important feature. In addition, the Ruby area contains a subtype of interest within the Douglas-fir type—a ridgetop limber pine and park association.

Proximity to Population Centers

The Ruby area is within five hours' drive of Billings, and all three areas are within five hours of Great Falls. However, these cities are near unusually rich wilderness opportunities, and designation of these three additional areas would have little added effect under this criterion.

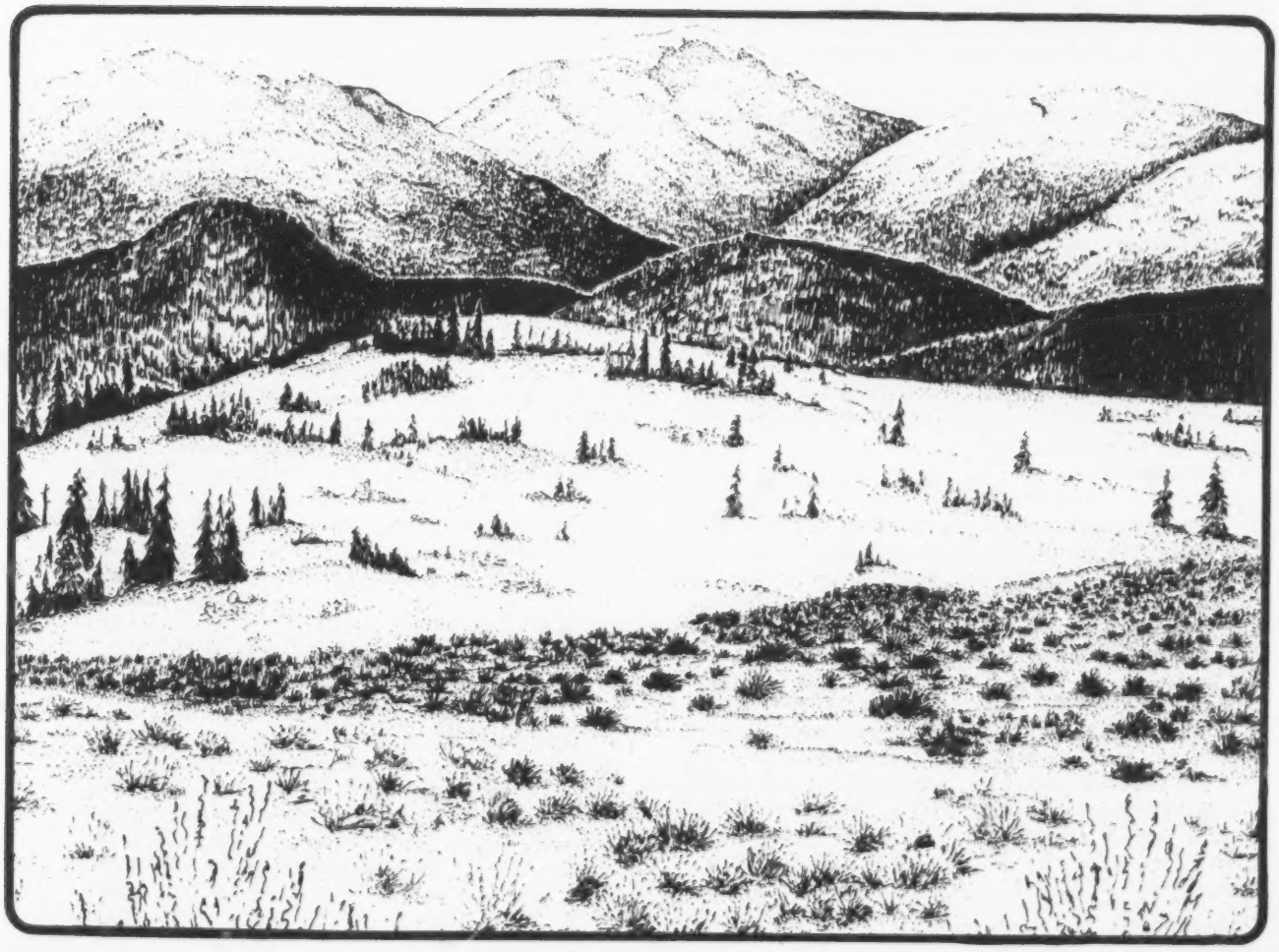
Geographic Distribution

These areas are in a three-state region with relatively extensive wilderness opportunities, and their designation would have no effect under this criterion. Locally, the areas recommended here, along with two former primitive areas previously recommended, bring the total of lands recommended for wilderness by the BLM in the Dillon Resource Area to 42,435 acres, or 4% of the lands in the resource area.

TABLE 22
ECOTYPES AND SUITABILITY RECOMMENDATIONS

Area	Ecotype			
	Douglas-fir Forest	Sagebrush Steppe	Foothills Prairie	Alpine Meadows-Barren
Ruby Mountains	13,400	1,300	400	500
Blacktail Mountains	6,900	600	2,300	1,200
Farlin Creek	440	170	—	—

Chapter 3
Environmental Consequences



ANALYSIS OF FACTORS COMMON TO ALL WSAS

WILDERNESS

Wilderness Supply

National, Regional, and Statewide Opportunities

From the perspective of the entire wilderness preservation system and of the system of units within the three-state region of Montana, Idaho and Wyoming, designation of the areas under study as wilderness would not be significant. From the perspective of the system within Montana, especially the system of designated and potential wilderness areas within five hours' drive of Great Falls and Billings, designation of the areas included in this study is not significant except insofar as it would extend the opportunities for a longer season of wilderness use within the state. All of the areas considered here, as well as virtually all of the rest of the BLM study areas in Montana, have a longer potential season of use than most existing areas in the state.

Local Opportunities

There are two existing and seven proposed wilderness areas in the two-county local area. The percentage of land in the two-county area in designated wilderness is 1.8%, while the percentage of the United States outside Alaska in wilderness is about 1%, including large areas with no designated wilderness. Other localities, particularly in the Rocky Mountain and Pacific Northwest regions, have a much higher percentage of land under wilderness designation than both the national average and the Beaverhead-Madison figure.

Although there are other FS units proposed for designation in the Beaverhead-Madison local area, recommendation of all or parts of the most qualified areas under study here for wilderness would not in itself lead to an "overabundance" of wilderness in the local area. The more pertinent question to be addressed is whether or not there would be significant effects on the local economy or on other resources, either positive or negative, under specific alternative proposals. The ultimate goal is to determine the "best" long term use for these lands.

Opportunities for Ecosystem Representation

Wilderness designation presents an opportunity for preservation of representative ecosystems in a natural state for scientific and educational purposes. Four major ecosystems are represented in the area under study: Douglas-fir forest, foothills prairie, sagebrush steppe, and alpine meadows-barren.

In Montana alone, there are examples totaling 192,000 acres of the Douglas-fir forest ecosystem in eight designated wilderness areas, and examples totaling 825,000 acres of the alpine meadows-barren type in seven designated areas. These types are well represented in existing wilderness in Montana, and including examples of them should be a significant consideration in this study only where subtypes of interest are involved.

There is only one example of the sagebrush steppe type, about 32,000 acres, in one designated wilderness in Montana; however, there are numerous opportunities other than those in this study for preservation of examples of this ecotype—in relatively large BLM study units in northern Nevada, eastern Oregon, southern Wyoming, and southern Idaho. Therefore, preservation of sagebrush steppe ecosystems in the areas under study here would add to the diversity of areas within Montana, but would not be crucial to preservation of this type in the wilderness system as a whole.

Available information indicates that there is only one example of the foothills prairie type in one designated wilderness in the entire wilderness system. It includes only 1,300 acres of this type, nearly the minimum for representation of a dynamic ecosystem. Areas under consideration in this study contain seven examples totaling about 17,000 acres. There are opportunities for preserving up to 17,000 additional acres of the foothills prairie ecotype in relatively small individual parcels in a total of nine proposed and further study areas in the state, not including areas in this study. These are apparently the only possible sources of additional representation of this ecotype in the National Wilderness Preservation System.

Multiple Resource Benefits

In all 8 WSAs, wilderness designation would aid in the long term maintenance of important wildlife habitats. Designation would also protect native vegetation through limiting timber cutting and restricting land treatments and the introduction of non-native plants. Restricting vehicle use would protect those cultural artifacts that could be removed by vehicle and would reduce stress on some species of wildlife. Wilderness would ensure the maintenance of scenic values by requiring that all new projects blend into the natural landscape. Soil and water resources would be protected by the careful placement of range improvements and restrictions on surface disturbances.

CULTURAL RESOURCES

Designation of any of these WSAs as wilderness will place cultural resources contained therein under the Wilderness Management Policy. To the extent compatible with wilderness preservation objectives and objectives for cultural resource management, these resources are available for recreational, scenic, scientific, educational, conservation, and historical uses (including ceremonial or religious use by Native Americans). Cultural resources in most instances will be subject to the forces of nature in the same manner as other wilderness values.

A decision to remove, maintain, or allow historic or prehistoric sites or structures to deteriorate naturally is an undertaking which will affect the resources. Such a decision is subject to compliance processes detailed in the provisions of federal regulations (43 CFR Part 3) to carry out the Antiquities Act of 1906, the Historic Sites Act of 1935, Executive Order 11593, the National Historic Preservation Act of 1966, as amended, and the Archeological Resources Protection Act of 1979, as are all other actions which may lead to adverse effects to sites eligible for nomination to the National Register of Historic Places.

Mitigative measures to record and monitor cultural resources are inherent in the Wilderness Management Policy, and if applied, wilderness designation of any WSA will prove beneficial to those cultural resources within the area through limitations of direct and indirect impacts resulting from development and unrestrained use. If such mitigative measures are not applied, adverse effect is certain to occur to sites of potential National Register value.

The no wilderness alternatives have the potential for indirect and incidental adverse effects consequent to development and unrestrained use. Direct project impacts will continue to be avoided or mitigated through existing cultural resource protective regulations.

WATERSHED

The adoption of all or partial wilderness alternatives would have a neutral impact on watershed in areas or parts of areas recommended for wilderness designation. Watershed specialists did not identify in the MFP any areas within the WSAs for mechanical treatment to improve soil or water conditions. Since management would for the most part remain as is, little impact, either positive or negative, would be expected. Some minor improvement in watershed conditions could be expected from elimination of vehicle travel in areas where such use now occurs.

The no wilderness and partial wilderness alternatives have potential for adverse impacts in areas or parts of areas recommended as nonwilderness. Mining and timber harvest activities would be permitted and could cause adverse impacts to water quality and/or soil stability.

GEOLOGY AND MINERALS

As indicated in Chapter 1, it was not possible to identify specific information on the sizes of deposits, ore grades, or dollar values for any particular mineral commodity. Therefore, the evaluation of impacts was based on general information of where there might be mineral potential, given the geology of the area.

Wilderness designation is not an irreversible or irretrievable commitment of mineral resources. Rather, it is a legislative commitment of resources. Nevertheless, designation or potential designation can impede or stop mineral exploration by adding a crucial element of uncertainty. Explorationists often are unwilling to commit resources on projects they may not be able to develop. Even though the Wilderness Act allows for some development, within certain environmental constraints, legal challenges and opposing public viewpoints often make development an uncertainty.

The short-term impact (before December 31, 1983) of wilderness designation would be to limit any exploration activities to those which would meet the nonimpairment criteria.

The long-term impact of wilderness designation is more significant. After December 31, 1983, or the date an area is designated wilderness by Congress, whichever is later, operations will be allowed only on those claims which had demonstrated a valid discovery as of that date.

After December 31, 1983, or the date designated as wilderness, if later than that, the areas are withdrawn from the mining and mineral leasing laws.

BLM policy is to specifically discuss any potential impacts on critical minerals availability. It is unlikely any of the WSAs can make any contribution to the nation's reserves of critical minerals. Strategic minerals are discussed further in the Bell-Limekiln, Blacktail Mountains, Farlin Creek, and Ruby Mountains WSA sections.

LIVESTOCK GRAZING

Grazing management in BLM wilderness areas will be governed by the Wilderness Management Policy (WMP) and Congressional direction in House Report 98-1128, unless the specific wilderness legislation dictates otherwise. In general, there will be no curtailment

of grazing simply because an area has been designated wilderness. Maintenance of existing range improvements and construction of new improvements necessary for rangeland and/or wilderness resource protection will be allowed. Occasional use of motorized equipment may be allowed for major maintenance or reconstruction projects, in emergencies, and in other situations where practical alternatives do not exist. However, such use will normally be limited to those portions of a wilderness where it had occurred prior to the area's designation. These guidelines are general in nature, and must be applied on a case-by-case basis.

The livestock grazing section for each WSA in this chapter will deal with the impacts of each alternative on proposed range improvements and stocking levels. These proposed range improvements and stocking levels were taken from the Mountain Foothills Grazing EIS, and no attempt was made to assess long-term impacts beyond the scope of the grazing EIS. Judgments as to which proposed improvements would be allowed are tentative and based on the provisions of the WMP. Potential impacts to ranch operating costs and mortgage values are covered in the socioeconomic section of this chapter.

SOCIAL AND ECONOMIC CONDITIONS

Recreation

Recreationists in southwestern Montana, in BLM and other surveys, have expressed a preference for primitive, semi-primitive and undeveloped recreation. Although the total area of the WSAs considered here is small, recommendations resulting from this study could influence to some degree the long-term availability of primitive forms of recreation locally.

Since no developed recreation sites were proposed in the Dillon MFP for any of the WSAs, and the current supply of developed sites in the local area exceeds demand, none of the alternatives will affect developed recreation opportunities.

Changes in public recreation use due to wilderness designation or nondesignation in the areas under study here will most likely not be significant to the local socioeconomic situation, nor will there be a significant increase in trespass on adjacent private land. The WSAs cover a relatively small area and have very light primitive and motorized recreation use currently. Wilderness designation of the most qualified areas would most likely not increase use of these areas significantly due to relatively extensive wilderness opportunities elsewhere in the three-state region. It is very unlikely that any of the areas under study here will ever become primary destinations for out-of-region wilderness users.

Outfitting and guiding enhances some recreation opportunities and provides a livelihood for a relatively significant number of individuals in the two-county area. In general, potential customers have a greater need for outfitter services in less accessible areas, so that the outfitter industry is to a great degree tied to the existence of relatively large tracts of undeveloped land. This being the case, the relatively small size of the individual WSAs in this study, and of the total area under study, limits the potential effects of recommendations made in this study on outfitting and guiding. Presently there are only two outfitters using a total of three of the areas under study here. This number could increase over time if other public lands in the local area were developed and some or all of these WSAs remained undeveloped. However, this would not likely be a significant number due to the relatively small size of the area involved.

Gaining public access to any of the WSAs under consideration could become a management and planning consideration if any of the areas were designated as wilderness. However, there are several feasible routes proposed in the Dillon MFP for access to each of the affected areas, and there are similar problems related to many nonwilderness recreation opportunities on public land in southwestern Montana. Therefore, access to the more popular and suitable public lands would be an issue whether they were designated wilderness or not.

Geology and Minerals

The economic viability of possible mineral deposits depends upon the quality of the ore, the extent of the deposit, the accessibility of the deposit, the price and demand for the commodity, and to some extent the presence of existing refining facilities. The designation of an area as wilderness affects the accessibility of known deposits and constrains the exploration for deposits. Prior to sending wilderness recommendations to Congress, the Bureau of Mines and the Geological Survey will prepare a more detailed examination of the mineral potential of those areas recommended as suitable. Based upon the information now available, the most likely minerals to be developed in the wilderness study areas are talc, gold, and silver. In addition, interest has been expressed in exploring for oil and gas, particularly in the Hidden Pasture Creek and Bell-Limekiln Canyons WSAs. As this area of southwest Montana is explored more, a better idea of the oil and gas potential will emerge.

Existing processing plants in Madison and Beaverhead counties may act to encourage further development of the Ruby Mountains talc deposits.

Interest in silver and gold mining remains high even though the prices of these metals have dropped significantly from the all-time highs of a couple years ago. Several WSAs, particularly Axolotl Lakes, Henneberry

Ridge, and Blacktail Mountains are near areas which have seen considerable silver and gold mining activity in the past.

While many factors contribute to the costs of mining and milling of gold and silver, estimates can be made to determine a range of values. The Forest Service estimated mining and milling costs for small vein deposits of gold and silver in the West Pioneer Mountains to be about $200/ton of sorted ore. This assumes underground mining methods. Average transportation charges to the smelter in East Helena would be about $20/ton. Although the charges for smelting are figured by a complex formula, an average charge would be about $80/ton (USDA, FS 1980). Other information suggests that the $200/ton figure for mining and milling is probably at the high end of the spectrum. A figure of $40/ton would represent the low end of the spectrum. Transportation and smelting charges would be the same.

For an operation to be economically viable, the return must be at least equal to the production costs (mining, milling, transportation, and smelting). Using the production costs given above and current smelter payment formulas, Table 23 gives estimates of the assay values that would be necessary for economically viable gold and silver operations.

TABLE 23

ASSAY VALUES FOR ECONOMICALLY VIABLE OPERATIONS

	Mining & Milling Costs/Ton	Trans. & Smelting Charges	Market Price/ Troy Oz	Assay Value (oz/ton)
Silver	$40 - $200	$100	$9	17.95 - 37.32
Gold	$40 - $200	$100	$400	.40 - .83

If the ore were concentrated near the mines, the costs of production would decrease considerably, and therefore the assay values necessary for an economic operation would decrease as well. Heap leaching is one process that could be used. This process is assumed to recover 85% of the values in the unmined ore, and would cost about $20/ton. Transportation cost would be reduced to $5 per ton and there would be no smelting charges (USDA, FS 1980). In addition, the mining and milling costs for a surface mining operation would be much less than for underground operations—in the neighborhood of $20/ton—which would further reduce the grade of ore required.

The above also assumes that there are no other valuable minerals in the deposit which may improve the economic value of a deposit.

Livestock Grazing

The impacts of wilderness designation on ranching and grazing management considered here are (1) the effect on manageability and operational cost of the ranch due to use restrictions, and (2) the effect on the value of the permit for borrowing purposes. Impacts on proposed range improvements and stocking levels are covered under the Livestock Grazing sections for each WSA.

The manageability problem involves the use of vehicles and other equipment to move livestock and salt, build and maintain range improvements, and inspect herds. Restricting vehicles to entering WSAs once or twice a year would create problems in work scheduling for ranchers and would possibly require the employment of more ranch workers. Those ranchers who salt every 30 to 35 days while in an allotment would have to haul some salt with horses. This would take longer than current methods since they usually carry only four salt blocks per pack horse. Scheduling of maintenance may also be affected adversely by limitations placed upon vehicle use. Present practices include maintenance in the spring as soon as the snow leaves the area and continuous maintenance through the summer months while the livestock are in the areas. With wilderness designation, the continuous use of motor vehicles would not be permitted but occasional use could be approved on a case-by-case basis.

A study done by the BLM in Oregon found that the use of horses added $.07 per AUM to the cost of the ranch operation. For the allotments within these WSAs, this would mean the added costs would range from a low of $.21 to a high of $108.36 per allotment per year.

A recent study (AMEC 1982) in eastern Montana also examined the possible increase in costs associated with using horses instead of vehicles for livestock operations in wilderness areas. This was done by designing a hypothetical example to reflect the cost of using a horse instead of a vehicle to perform the same tasks. The example and the assumptions used by AMEC have been revised slightly for use in this effort to better reflect the existing situation in southwest Montana.

It must be emphasized that the example is only hypothetical. Each operation will be different, based on such things as number of miles of fence, distance traveled, and amount of salting needed. However, the example provides a general idea of the relative costs of using a horse instead of a vehicle. The following assumptions were used in the analysis for this example:

1. The grazing season is 4 months.
2. Salting requires twice as many trips using a horse as a vehicle.
3. Checking of fences and minor maintenance takes one and a half times as long using a horse as a vehicle.
4. The operator already has an adequate number of horses to do these jobs.
5. Travel time is half as long with a vehicle as with a horse.
6. The operator must travel 10 miles round trip.
7. The wage rate is $5/hour.
8. The vehicle gets 5 miles per gallon.
9. The price of fuel is $1.33/gal.

Using these assumptions, the additional costs shown below were derived.

In the example below, the additional cost of using horses amounts to $143 per year.

These results are not directly comparable to those of the Oregon study cited above, because the Oregon study is based on AUMs and the eastern Montana methodology is based on a single hypothetical example. However, the assumptions used in the two studies are similar, and the additional costs turn out to be similar.

Interviews with representative ranch operators indicated that for sheep and cattle operations that had a large number of range improvements, or required extensive salting, wilderness designation might require hiring additional ranch hands.

Wages for ranch hands in Montana for 1980, surveyed by the Montana Employment Security Commission, ranged from $653 to $1,019 per month. Therefore, any need to employ more workers could be relatively expensive. In addition, there may be a lack of experienced, reliable ranch workers in certain areas. Work would generally be seasonal and scheduling of vehicle use in an area would affect the chances of successfully hiring seasonal ranch hands.

Using the example given above and the interviews with ranch operators, additional operating costs related to possible restrictions on the use of motorized vehicles were analyzed on a relative basis for each WSA. No analysis of individual, specific operations was attempted due to the complexity involved and time and cost considerations. However, information from interviews with a few livestock operators representative of the types of ranching operations found in the WSAs were used. It was possible to assign relative costs using factors such as the size of individual allotments and the portion within a WSA; number of AUMs in individual allotments and the portion within a WSA; season of use; type, number and location of existing and proposed range improvements; and the location of the WSA portion of the allotment relative to the remainder of the allotment. These factors were aggregated by WSA, and produced the estimates of possible additional costs shown in Table 24.

These cost estimates of course do not take into account the specific financial situation of each operator. For instance, they do not consider the effects of a small cost increase on relatively marginal operations. However, they are considered valid for an overall comparison of costs by WSA.

Costs Using Vehicles

Salting				
Fuel Cost	=	4 trips x 10 miles/trip ÷ 5 mpg x $1.33/gal	=	$11
Labor Cost	=	4 trips x 2 hours/trip x $5/hour	=	$40
		Total Salting Cost	=	$51
Initial Fence Repair				
Fuel Cost	=	3 trips x 10 miles/trip ÷ 5 mpg x $1.33/gal	=	$8
Labor Cost	=	3 trips x 10 hours/trip x $5/hour	=	$150
		Total Initial Repair Cost	=	$158
Fence Checking (and minor maintenance)				
Fuel Cost	=	3 trips x 10 miles/trip ÷ 5 mpg x $1.33/gal	=	$8
Labor Cost	=	3 trips x 10 hours/trip x $5/hour	=	$150
		Total Fence Checking Cost	=	$158
		Total Cost Using Vehicles	=	$367

Costs Using Horses

Salting	=	8 trips x 3 hours/trip x $5/hour	=	$120
Initial Fence Repair	=	3 trips x 11 hours/trip x $5/hour	=	$165
Fence Checking	=	3 trips x 15 hours/trip x $5/hour	=	$225
		Total Cost Using Horses	=	$510

TABLE 24
ADDITIONAL COSTS TO LIVESTOCK OPERATORS

WSA	Relative Additional Cost to Livestock Operators due to Wilderness Designation
Ruby Mountains	
All Wilderness	Moderate
Partial Wilderness	Low
Blacktail Mountains	
All Wilderness	Low
Partial Wilderness	Low
East Fork	
All Wilderness	Low
Hidden Pasture	
All Wilderness	High
Bell-Limekiln	
All Wilderness	High
Henneberry Ridge	
All Wilderness	Moderate
Partial Wilderness	Low
Farlin Creek	
All Wilderness	Low
Partial Wilderness	Low
Axolotl Lakes	
All Wilderness	High

Another possible impact is the effect of wilderness designation on the value of the public grazing permit for borrowing money and for determining the market value of the base property. In practice these permits are valued due to the grazing fees charged being lower than the market rate for private grazing. As the price of federal grazing approaches the private rate, the permit value will become less important.

The value of the grazing permit for securing a production loan appears to be affected to some extent by wilderness designation. A survey done on this subject (AMEC 1982) asked a variety of lending agencies in eastern Montana to review a hypothetical ranch and indicate how much they would loan with or without wilderness designation in this survey. Wilderness designation reduced the value of the permit for borrowing purposes by 20% to 100%. Although the BLM's Wilderness Management Policy permits the continuance of existing grazing activities and facilities, and the construction of new facilities on a case-by-case basis, the primary reason given for this reduction was the uncertainty of what the actual policies of the government would be concerning grazing use by permittees. Other factors considered by the lending agencies were the dependency of the individual ranch on grazing in wilderness, the effectiveness of management of the ranch, and the ability of the entire ranch to produce income over the life of the loan.

A recent informal survey of selected Beaverhead and Madison county lending agencies produced somewhat different results from those of the AMEC study. In general, the lending agencies contacted indicated that production loans would not be affected provided that AUMs and operating costs remained the same. Any increase in operating costs would result in a proportional reduction in the amount of the loan. For example, a 5% increase in cost due to designation would result in a 5% reduction in the amount the rancher could borrow. Security for the loan and the ability to repay were considered more important factors. There was no consensus among the lending agencies contacted on the effect of wilderness designation on loans for purchase. However, it appears that the same factors affecting production loans would be the major considerations.

Timber Management

The value of timber forgone by designation of an area as wilderness was estimated at two interest rates, taking into account the value of the timber and the cost of building a road to the timber stands. Construction and maintenance of the roads are calculated to be born solely by the forestry activity. This is legitimate if forestry is the only reason for the construction of these roads. If there are other reasons for constructing these roads, the costs should be born by all those activities which would use the road. Therefore the present net worth calculated by the model could be higher than shown if road costs were to be born by activities other than forestry. The model used assumes current prices for wood products. If prices increase in the future, these stands could become more economic to harvest. Prices would have to increase faster than the costs of harvesting for this improvement to occur.

The interest rates chosen for analysis are 4 and 7-3/8%. The 4% rate is used by the FS for forestry. The 7-3/8% rate reflects the rate used for federal water projects. The choice of the interest rate for timber is a management decision. The lower the interest rate, the more likely a timber stand will be cut now.

The only WSA timber stands showing a positive present net worth at either interest rate are in Ruby Mountains, Farlin Creek, and Axolotl Lakes. If the 7-3/8% rate is used, only Axolotl Lakes is currently harvestable at a profit. If, as the model assumes, 10% of the timber is cut in a decade, employment generated due to timber production in the Axolotl Lakes area would amount to about 1.7 jobs per year in the lumber industry.

Much of the timber in these areas has not been logged due to the remoteness of the areas and the ruggedness of the terrain. Some timber has been cut in in the Axolotl Lakes area and the Blacktail Mountains in the past.

ANALYSIS OF INDIVIDUAL WILDERNESS STUDY AREAS

RUBY MOUNTAINS, MT-076-001

Alternative R-1, All Wilderness

Wilderness

The Ruby Mountains WSA is a diverse, high-quality area for its size, and its designation would add positively to the wilderness preservation system. Inclusion of both the north and south slopes of the range would insure diversity within the WSA, and though the predominant Douglas-fir ecosystem is already represented, the limber pine subtype and sagebrush/grassland types would provide some diversity in the wilderness system. Other positive factors are the area's exceptional opportunities for solitude; scenic, challenging terrain; special features of a large ungrazed area including undisturbed wildlife habitat, especially for mule deer; and a somewhat longer season of use than the bulk of the areas in the wilderness system.

Wilderness designation would aid long term management of important elk and deer habitat, and significant visual and cultural resources.

There would be manageability and quality concerns, however. Most of the unit boundaries are irregular legal boundaries not readily identifiable on the ground. The southwest portion is essentially isolated from the rest of the WSA by private land along McHessor Creek and is extremely narrow and irregular. The extreme south is affected by sounds from the talc mine. There are four nonpublic inholdings that could become management problems if they were not acquired. In particular, providing access to the state section around Ruby Peak would cause major impacts, depending on the route selected. These inholdings logically would be a part of the recommended area, as they comprise some of its major features, particularly in the area around Ruby Peak and Hinch Creek.

In the south central portion, a concentration of vehicle ways and range improvements has a moderate impact on naturalness; and the stock driveway has a noticeable impact, though it would not be a major management problem due to the small amount of use it receives. The core of the WSA could be effectively managed as wilderness, though some of the peripheral areas would present management problems.

Wilderness designation would aid in long-term management of important mule deer habitat, and significant visual and cultural resources.

Recreation

There would be relatively minor adverse effects on motorized recreation opportunities, as most of the study area is unsuitable for motor vehicle use. Potential public access via Hinch, and secondarily, Garden Creek, would be forgone. Other potential access routes would be limited to reaching the mouths of the canyons in the rugged northern portion of the range, with few opportunities forgone. There would be a slightly beneficial effect on primitive recreation by curtailing most of the minor, existing motor vehicle use in the area.

Visual Resources

The entire WSA would be managed as VRM Class I and existing scenic values would be preserved.

Wildlife

Restrictions on timber harvesting and prescribed burning would assure a continuing supply of security cover. However, such restrictions would also result in a lost potential for enhancement of forage production for mule deer. That is, since the availability of forage is currently the limiting factor for mule deer, logging or burning of forested land on select north slopes would improve forage production and thus improve mule deer habitat.

However, restrictions on logging and prescribed burning as a result of wilderness designation could have a beneficial effect on elk habitat, particularly on security cover in the southern part of the range.

Under current management direction the forage in the northern part of the range is allocated to wildlife and not to livestock. Although wilderness designation would guarantee the continuation of this policy over the long term, it is unlikely that this policy would change even without wilderness designation, because of the nature of the area.

Restrictions on mineral development would have a beneficial effect on widlife by protecting existing security cover and wildlife use patterns.

Other surface-disturbing or vegetative-manipulation activities, such as the sagebrush burning proposed for the southern part of the unit, would be prohibited, with beneficial effects on mule deer.

Geology and Minerals

As discussed in Chapter 1, the Ruby Mountains area has a high potential for talc (see the Ruby Mountains

Mineral Potential map). Two talc mines, the Beaverhead Mine (Cyprus Industrial Minerals) and the Treasure Mine (Pfizer Inc.), are located south of the WSA. The Beaverhead Mine produces approximately 30,000 tons per year with reserves of approximately 450,000 tons. The Beaverhead Mine has been closed because of economic conditions (January 1982). The Treasure Mine produces approximately 125,000 tons per year. Reserves are approximately 2,000,000 tons. Since talc potential in this WSA is largely unknown, it is impossible to predict the impacts of wilderness designation on future commercial availability. However, existing information suggests that the potential for talc is highest in areas just south of the WSA close to the existing mines.

Talc is listed as a critical mineral in the National Defense Stockpile Inventory of Strategic and Critical Materials. The current inventory of talc is approximately 80 times the 1980 supply goal of 28 tons (USDI, BM 1981). It is unlikely that designation of the Ruby Mountains WSA as wilderness would have an impact on the strategic availability of talc.

Potential for other metamorphic minerals and for metals is largely unknown. Existing information suggests moderate potential for metamorphic minerals and low potential for metallics. Potential for oil and gas is also limited based on existing information.

Livestock Grazing

Allotments, AUMs, and range improvements within the area recommended for wilderness would be identical to those described in Chapter 1. The 900-acre prescribed burn proposed for the Garden Creek Allotment would probably be prohibited. The burn would yield about a 90-AUM increase in surveyed grazing capacity. Increases in livestock AUMs forgone would be considerably less than the full 90 AUMs; the primary purpose of the burn is to lessen impacts on riparian habitat by creating a better distribution of livestock. This goal could be partially met by an alternative method: gap fencing, which would create a rest rotation scheme in the affected creek bottoms. Prohibition of the burn would not adversely affect implementation of the Garden Creek AMP. There would be no other impacts to proposed improvements or stocking levels.

Timber Management

As explained in Chapter 1, a timber evaluation of the study area shows the present net worths displayed in Table 25.

The potential sustained yield harvest from EAU 4 (the only EAU with a positive PNW) is about 1,024 mbf per decade. Given the probable harvest schedule shown in the table below, the total board feet of timber foregone over a 100-year period under this alternative is about 6.3 mmbf. Any future potential of EAU 1, 2, and 3 would also be lost.

TABLE 25
SUMMARY OF PRESENT NET WORTH OF TIMBER
RUBY MOUNTAINS

EAU	PNW at Discount Rate of 4%	7-3/8%
1	$-59,244	$-79,706
2	-88,720	-81,482
3	-30,406	-27,174
4	+21,463	-24,502

In the short run no timber harvest is planned for this area due to the roughness of terrain and economics of logging. In the long run the potential harvest shown in Table 26 is forgone.

In the long run the proposed action would not change the potential of the land for forest growth. Ingrowth would approximately equal mortality. As long as the area remained wilderness, the removal of forest products would not be possible.

Alternative R-2, No Wilderness

Current Management Direction

Current specific management direction contained in the Dillon MFP for this WSA is as follows:

—Provide public access to the area with restrictions to protect wildlife habitat and primitive recreation.

—Allow timber and minerals activity subject to interdisciplinary review.

—Inspect the stock driveway and mitigate existing damage through management, relocation, or elimination of use if necessary.

—Permit only minor change to visual resources at the north end of the range (VRM Class II), moderate change at the south end of the range (VRM Class III), and significant change on a small piece of prairie on the east (VRM Class IV).

—Allocate forage in the north end of the range (12,640 acres) to wildlife.

Seven roads are proposed in the area. Five of these at the north end of the range are proposed for recreation access and/or timber management. The recreation proposals generally would only provide access to the area, without penetrating it. The more detailed forestry analysis in this study shows low timber management potential at the north end of the range, so the forestry access proposals are not likely to be implemented.

At the south end of the range, roads are proposed in Hinch Creek and in the Garden Creek-McHessor Creek

TABLE 26

TOTAL POTENTIAL HARVEST VOLUME/DECADE (MBF)
RUBY MOUNTAINS

Decade	1	2	3	4	5	6	7	8	9	10
Volume (Tractor Logged Areas)	90	21	310	256	612	612	612	612	612	612
Volume (Cable Logged Areas)	140	489	679	1,451	1,451	1,799	1,799	1,799	1,799	1,799
Total Volume (All EAU's)	230	610	989	1,707	2,063	2,411	2,411	2,411	2,411	2,411
Volume EAU #4	0	0	0	641	641	1,024	1,024	1,024	1,024	1,024

corridor for timber management and recreation access. There is a good possibility, given the forestry analysis in this study, that some timber harvest would occur in Garden Creek and possibly other areas in the southern part of the WSA.

Areas considered logical for talc exploration exist in the southern and central parts of the WSA, and there would be a possibility of exploration and some development in the area in the future, depending on the feasibility of developing other, more accessible talc reserves.

Wilderness

Under this alternative, the north end of the Ruby Range would likely retain its natural character, at least in the short term. Proposed recreation and forestry access and management actions would have the greatest effect in Garden Creek, in the southern end of the range. Exploration for talc in the central and southern parts of the area is a possibility in the future; impacts could be minimal to major depending on the extent of the activity and the access route selected. Any proposed timber and mineral activity, however, would likely be allowed subject to interdisciplinary review. The MFP decision concerning the stock driveway could improve the natural character of that part of the unit if the driveway were relocated and/or rehabilitated.

Recreation

There would be moderately adverse impacts on primitive recreation in the southern portion of the range mainly due to road construction, additional motor vehicle use, and timber harvest. The central and northern portions of the range would likely see little change in primitive recreation opportunities—except for better public access, which would be similar under all alternatives—unless future mineral exploration or timber harvest affected the area. In either of these cases, motorized recreation opportunities would be improved.

Visual Resources

At least in the short term, the north end of the range would be managed as VRM Class II, and its outstanding visual resources (Scenic Quality Class A) substantially retained. The south end of the range, also Class A, would be managed to allow a moderate change in visual resources (VRM Class III).

Wildlife

This alternative could result in a larger total mule deer population. That is, as discussed earlier, timber harvesting or burning of select north slopes could improve forage production and thus increase total deer numbers.

It is unlikely that the present management direction, which allocates the forage in the northern part of the range to wildlife, would be changed in the future.

In the southern end of the unit, there are proposed access roads in Hinch and Garden creeks and there is potential for timber harvesting in those areas. If these activities were to take place, they would have a detrimental impact on elk habitat and would disturb elk movements and use patterns. The sagebrush burns, which are proposed for about 900 acres in the southern portion of the WSA, would have a short-term detrimental impact on mule deer. Any future mineral development would likely have a detrimental effect on wildlife by reducing security cover and disrupting use patterns.

Geology and Minerals

There would be no impact on mineral exploration and development. Mineral exploration and development would still be regulated to prevent unnecessary and undue degradation of the land.

Livestock Grazing

Grazing management would be based on the Mountain Foothills EIS. As directed in the Dillon MFP, management of the stock driveway would be reviewed. Management of the stock driveway would be similar under all of the alternatives considered here.

Timber Management

Garden Creek (EAU #4) would be available for inclusion in the district's timber sale plan, and a potential harvest of about one million board feet of timber per decade would be available. Other EAUs would be re-evaluated periodically for possible inclusion.

Alternative R-3, Partial Wilderness

Wilderness

A substantial number of the impacts on the natural character of the Ruby Mountains WSA would be eliminated, including the concentration of imprints of man in the south central portion. Also excluded are about 1.5 miles of the constructed portion of the stock driveway and about 4 miles of vehicle ways on the east side of the study area. The main impacts remaining are a few dead end vehicle ways and about 4 miles of the stock driveway, 3 of which were constructed. The driveway remains a relatively significant impact for less than a mile south and west of Ruby Peak; most of the remainder follows Big Dry Creek through heavy timber and is much less noticeable.

This alternative significantly improves manageability of the WSA as wilderness. It would eliminate the irregular, isolated southwestern thumb; mitigate management problems associated with two inholdings in the Hinch Creek area; eliminate the offsite effects of the existing talc mine at the extreme south of the study area; establish generally identifiable features as boundaries on the south; and establish more regular legal boundaries on the east and west, some of which correspond roughly to natural features. The two remaining inholdings would continue to be management concerns regarding rights of access and possible nonconforming activities. The state section around Ruby Peak would be the major concern. Acquisition of these inholdings would eliminate the potential for management problems. Management of the stock driveway would not present a major problem due to the small amount of use it receives, and management would be essentially the same under wilderness or nonwilderness, given the consistent directives of the Dillon MFP and the BLM Wilderness Management Policy. Several logical public access routes to the area could also be pursued under this alternative, similar to those in the Dillon MFP decisions.

The wilderness quality of the area recommended for designation would be similar to that under Alternative R-1 except that ecosystem and habitat diversity is reduced under this alternative. About three-fourths of the sagebrush steppe and foothills prairie acreage in the original WSA would be excluded. The recommended area would lie predominantly on the north, forested slope of the range, including the entire area not grazed by livestock, and only about 1,700 acres would remain in sagebrush and grassland ecotypes. Some of the elk winter range and spring-summer-fall range in the original WSA is excluded.

The boundaries would also include over 2,000 acres of pristine ridges and canyons south of the portion of the stock driveway that would remain in the area recommended for wilderness.

Recreation

Most of the southern end of the Ruby Range would be allocated to nonwilderness use, and there would be adverse impacts on primitive recreation and beneficial effects on motorized recreation due to the proposals for road development and timber harvest. Current opportunities in the rugged north end of the range would be essentially unaffected by wilderness designation.

Visual Resources

Under wilderness designation the north end of the range and a small portion of the upper Hinch Creek drainage would be managed as VRM Class I, and the existing, outstanding scenic values would be preserved. In most of the southern end of the range, moderate change (VRM Class III) would be allowed in an area of Class A scenic quality according to current management direction.

Wildlife

Timber harvesting or prescribed burning of forested land could take place in the portion of the WSA not designated as wilderness. This could improve forage production in those areas. The area designated as wilderness would ensure a continuing supply of security cover. Other impacts would be the same as for Alternative R-1 for those areas designated as wilderness, and the same as for Alternative R-2 for those areas not designated as wilderness.

Geology and Minerals

While the partial wilderness alternative would remove one area from wilderness consideration which may have potential for talc, the Ruby Peak area would remain in the wilderness study area. The Ruby Peak area may have the best potential for talc within the WSA, although other areas south of the WSA may have a higher potential. Impacts would be similar to the discussion under the all wilderness alternative.

Livestock Grazing

There would be livestock grazing on about 3,000 of the 15,615-acre area recommended for wilderness. The area recommended for nonwilderness would be managed according to the Mountain Foothills EIS.

None of the McHessor Creek Allotment would be included in the area recommended for wilderness. About 800 acres (8%) of the Garden Creek Allotment would be included, along with all or portions of the four custodial allotments in the original WSA. Two devel-

oped springs and a 4-mile section of the stock driveway would be the existing range management developments within the area. The southern part of the stock driveway, a seasonal camp, a vehicle access route in Hinch Creek, and the line shack in Garden Creek are range management features that would be excluded from the proposed wilderness under this alternative. Of the 838 livestock AUMs in the original WSA, 190 would remain in the proposed wilderness—85 in the Garden Creek Allotment and 105 in the four custodials.

About 100 acres of the 900-acre prescribed burn proposed in the Garden Creek AMP would remain in the area recommended for wilderness. The high priority area north of Garden Creek could be burned, as it would be located outside the wilderness boundary. An increase of a maximum of 10 livestock AUMs would be forgone, and there would be no effect on implementation of the AMP. The primary purpose of the burn is to lessen impacts on riparian vegetation through better livestock distribution, and this objective could be substantially met by burning to increase forage outside the area recommended as wilderness. There would be no other impacts to proposed improvements or stocking levels.

Timber Management

All four EAUs would be completely outside the area recommended for wilderness designation, and the impacts would be the same as for Alternative R-2.

BLACKTAIL MOUNTAINS, MT-076-002

Alternative B-1, All Wilderness

Wilderness

As an addition to the wilderness system, the area recommended under this alternative is a relatively high quality area for its size. It has significant diversity, with rugged terrain, numerous canyons and cirque basins on the north slope of the Blacktail Range, and gentle, open subalpine grassland at the crest. Important elk range, a relatively long snow-free season of use at the WSA's lower elevations, and the ungrazed north slope contribute to quality in addition to the mandatory characteristics.

The area's irregular configuration raises manageability considerations. The southeastern portion is very narrow and irregular, and the central and western portions are affected by protrusions of state and private land. Acquisition of approximately 1,320 acres by exchange would alleviate this last concern.

Although there is one pre-FLPMA oil and gas lease, it is in the northwest corner of the WSA and since there appears to be low oil and gas potential, this lease should not be a management problem. There is a concentration of mining claims in the Jake Canyon-Silver Queen area. On claims with valid discoveries, maintaining wilderness conditions and at the same time authorizing mining activity allowable under the Wilderness Management Policy could become difficult if several of the claims were proposed for development. If any such claims in the interior of the area were patented and passed into private ownership, management of the remainder of the WSA as wilderness would be more difficult. Mining activity on valid claims along the Blacktail Fault on the north would likely be limited in extent within the WSA and therefore not be a major problem.

Recreation

There would be little effect on current recreation use or opportunities. The only existing vehicle routes extending any distance into the WSA are very lightly used routes from the south. Public recreation access proposed in the Dillon MFP would be affected only minimally as the proposed road would reach only a short distance up Ashbough Canyon and it could provide practically equivalent access if it ended at the public land boundary. Other feasible access routes also exist, and the public access situation would be similar under all alternatives considered.

Visual Resources

The entire WSA would be managed as VRM Class I, and existing scenic values would be preserved.

Wildlife

Deer and elk would benefit by maintaining security cover. Restrictions on timber harvesting and road construction would ensure the long term availability of security cover. There are currently ORV restrictions in this area to protect important elk and deer winter range. Wilderness designation would guarantee the long-term continuation of these restrictions. The Blacktail Ridge contains suitable habitat for both bighorn sheep and peregrine falcon. Although there are no existing plans for introducing these species, wilderness designation would preserve suitable habitat for them over the long term.

Restrictions on mineral development would have a beneficial effect on wildlife by protecting existing security cover and wildlife use patterns.

Geology and Minerals

As displayed on the Mineral Potential map, the Blacktail Mountains have some potential for several different minerals, particularly gold, silver and nickel. Potential

for oil and gas is limited based on existing information. Potential for other leasable minerals is also limited. Under this alternative, all the areas with potential for gold, silver, and nickel would be inside the area recommended for wilderness. If these deposits are not explored or developed before the area is designated as wilderness, or by December 31, 1983, whichever is later, any potential would be forgone over the long term.

Both silver and nickel are listed as critical minerals and the areas with the highest potential for these minerals would be inside the area recommended for wilderness under this alternative. However, given the nature of the occurrences, it is unlikely that these deposits would have a significant impact on the availability of either mineral.

Livestock Grazing

Allotments, AUMs, and existing and proposed range improvements within the area recommended for wilderness would be as described in Chapter 1. There would be no significant impacts to proposed improvements or stocking levels.

Timber Management

The evaluation of the study area timber shows a negative present net worth for all EAUs at discount rates of 4% and 7-3/8%. These values are shown in Table 27.

Table 28 shows the potential harvest that would be forgone under this alternative.

The existing land use plan for this area allows timber harvest activity subject to interdisciplinary review. Unfavorable economics restricts any immediate development. As shown above, in the long run all potential yield would be forgone.

The proposed action will not change the potential of the land for forest growth.

TABLE 27

SUMMARY OF PRESENT NET WORTH OF TIMBER

BLACKTAIL MOUNTAINS

EAU	PNW at Discount Rate of 4%	7-3/8%
1	$-124,581	$-197,081
2	-156,543	-118,107
3	-60,912	-31,425

Alternative B-2, No Wilderness

Current Management Direction

Current management direction for the Blacktail Mountains WSA consists of the following:

—Restrict vehicle access for wildlife habitat protection.

—Allow timber and minerals activity subject to interdisciplinary review.

—Permit only minor changes in visual resources in the northwest portion of the range (VRM Class II), significant change in the higher elevation areas in the southeast (VRM Class IV), and moderate change in most of the rest of the WSA (VRM Class III).

Recreation access is proposed a short distance up Ashbough Canyon. This road and three other roads are also proposed for timber management. The timber analysis in this study, however, shows that timber management potential is relatively low, and while some future activity is possible, development is not likely to be extensive. Additional hardrock mining activity in the Jake Canyon-Silver Queen area and along the Blacktail Fault is likely, though presumably the latter would not extend far into the WSA.

Wilderness

The area north and west of the Jake/Riley Canyon divide would presumably remain in a substantially natural condition unless timber and mining operations become extensive some time in the future. The area around Jake Canyon would likely receive some adverse impacts due to hardrock mining activity.

Recreation

In the short term, public recreation access would be gained to the area as proposed in the Dillon MFP, but motorized recreation opportunities would not increase because access would only be provided to the area and not actually into it. In addition, current ORV restrictions lessen the opportunities for motorized recreation. Primitive recreation would be enhanced by access (which would be similar under all alternatives considered) but would be adversely affected at least in some parts of the WSA by mining and/or timber harvest. Motorized recreation opportunities could be improved in the long term if new roads for resource extraction were developed.

Visual Resources

The majority of the WSA consists of Class A quality visual resources. At least in the short term, the north face of the Blacktail Range west of Coyote Canyon would be managed to substantially retain the existing values. In most of the remainder of the WSA, moderate or significant change to the outstanding scenic quality would be allowed.

Wildlife

Current management direction for this area restricts vehicle access to protect deer and elk habitat, particularly security cover. This will protect the habitat values over the short term, but long-term protection is not guaranteed. Any future road construction, timber har-

TABLE 28
TOTAL POTENTIAL HARVEST VOLUME/DECADE (MBF)
BLACKTAIL MOUNTAINS

Decade	1	2	3	4	5	6	7	8	9	10
Volume (Tractor Logged Areas)	366	613	1,048	1,085	1,382	1,395	1,395	1,395	1,395	1,395
Volume (Cable Logged Areas)	232	232	777	1,111	1,368	1,488	1,488	1,488	1,488	1,488
Total Volume (All EAUs)	598	845	1,825	2,196	2,750	2,883	2,883	2,883	2,883	2,883

vesting or mineral development would have a detrimental impact on deer and elk habitat and could disrupt deer and elk movements and use patterns.

Geology and Minerals

This alternative would have no impact on mineral exploration and development. However, such activities would still be regulated to prevent unnecessary and undue degradation of the land.

Livestock Grazing

Proposed improvements and stocking levels would be based on the Mountain Foothills EIS, and would not differ significantly under any of the alternatives considered here.

Timber Management

There would be no impact in the short run. At present, the cost of road development and the existing market situation for timber prevent any serious sales planning in the area. The area would be reevaluated periodically for future inclusion in the allowable cut base and timber sale plans.

Alternative B-3, Partial Wilderness

Wilderness

This alternative would significantly improve manageability of the Blacktail unit as wilderness by eliminating both the narrow, irregular configuration in the southeast portion and the Jake Canyon-Silver Queen mining claims group. The recommended area under this alternative would have essentially the same wilderness qualities as the area recommended under Alternative B-1, with the exception that the elk and deer winter range in the Jake Canyon area would not be within the recommended area under this alternative. Management as wilderness would aid in long-term management of important spring-summer-fall deer and elk habitat, and significant visual and cultural resources.

The remaining management consideration is the protrusion of state and private lands into the central and western portions of the area. All these lands are primarily natural in character and physiographically a part of the Blacktail crest. In the central portion, state land lies at the head of Riley Canyon and along the crest of the range, and on the west, state and private lands lie on the crest and at the head of Ashbough Canyon. Acquisition of 1,320 acres in these two areas would improve manageability, and would topographically unify the recommended area by extending it to the crest of the range, which is a natural route of travel. The only additional management consideration would be the use of a seasonal camp and associated motor vehicle use on state land in the western area by a grazing permittee, a use that can be accommodated under the Wilderness Management Policy.

Public access to the area could be achieved through Ashbough Canyon following a Dillon MFP decision, or by some other route such as Riley Canyon.

Recreation

The very limited motorized recreation opportunities in the northwestern area recommended for designation would be forgone. The currently limited primitive recreation opportunities in the nonwilderness southeast part would likely be adversely affected by mining activity. Public recreation access needs and proposals would be similar under this and the other alternatives.

Visual Resources

The portion of the WSA that would be recommended for wilderness under this alternative would be managed as VRM Class I, and existing scenic values would be retained. Most of the portion recommended as nonwilderness consists of Class A quality visual resources, and moderate or significant change would be allowed, according to current management direction.

Wildlife

A major portion of the crucial elk and deer winter range would be outside of the area designated as wilderness and consequently not as protected as it might be. Other impacts would be the same as for Alternative B-1 for those portions recommended for wilderness and the same as for Alternative B-2 for those portions not recommended for wilderness.

Geology and Minerals

The partial wilderness alternative removes most of the area with the highest mineral potential from consideration. Much of the area along the Blacktail Fault would be within the area recommended for wilderness. However, the Jake Creek area is the area most likely to see actual mineral development and it would be outside the area recommended for wilderness. This alternative excludes from the area recommended for wilderness most of the areas with high potential for nickel and silver. In any case, given the nature of the occurrences, it is unlikely that these deposits would have a significant impact on the availability of either mineral.

Other potential impacts are the same as Alternative B-1 for those areas recommended for wilderness and the same as Alternative B-2 for those areas not recommended for wilderness.

Livestock Grazing

Under this alternative, most of the Matador-Blacktail Allotment would be excluded from the area recommended for wilderness. About 1,650 acres (20%) of the allotment, and 10 of its 176 AUMs, would be included. Otherwise, allotments and existing and proposed developments within the proposed wilderness would be identical to those under Alternative B-1, All Wilderness. A total of 257 AUMs are within the area recommended under this alternative. There would be no impacts to proposed range improvements or stocking levels.

Timber Management

This proposal would leave half of EAU 2 and all of EAU 3 in the allowable cut. Table 29 shows the potential harvest volume that would be available for timber harvest under this alternative.

The above is approximately 30% of the available Blacktail volume and would be available in the base acreage for harvest. The remaining 70% of the potential volume which is not currently economic to harvest would not be available for any future harvest.

EAST FORK OF BLACKTAIL DEER CREEK, MT-076-007

Alternative EF-1, All Wilderness

Wilderness

This alternative, which includes closing the East Fork road, would enhance opportunities for solitude and primitive recreation and improve manageability by including the intruding road corridor in the proposed wilderness. This alternative would aid, in the long term, in preservation of the area's natural character, excellent primitive recreation opportunities, and special features such as undisturbed elk and mule deer range and significant visual resources. Preservation of examples of four major ecosystems in such a small area would also be a positive effect. Wilderness management would also aid in long-term management of sensitive soils, which, along with wildlife values, prompted the current vehicle restrictions in the area.

The inclusion of the East Fork road, however, would add a relatively noticeable human imprint that would likely return to a natural condition only over a long period or with mechanical rehabilitation. The unit's small size and irregular boundaries would detract from opportunities for solitude and manageability. Given the small, irregular area and the uncertain long-term management of adjacent lands, the possibility of effective management of the East Fork as wilderness is doubtful.

Recreation

Under this alternative the East Fork road would be closed at the public land boundary, and the important use of vehicles on this road for hunting access and dispersed camping would be eliminated. Wilderness recreation would be enhanced by the road closure.

TABLE 29

POTENTIAL HARVEST VOLUME/DECADE-PARTIAL WILDERNESS (MBF)
BLACKTAIL MOUNTAINS

Decade	1	2	3	4	5	6	7	8	9	10
Volume	0	0	288	605	798	1,010	1,010	1,010	1,010	1,010

Visual Resources

The entire WSA would be managed as VRM Class I under wilderness designation. The existing scenic values, predominantly Class A, would be preserved.

Wildlife

This alternative would provide protection for year-round elk and mule deer habitat over the long term. It would maintain vegetative cover and forage for big game, especially elk, assuring the preservation of winter thermal cover and security cover for elk calving. This alternative would not change many of the constraints now being applied to other activities and programs to maintain and/or improve wildlife habitat, such as the no surface occupancy stipulation which is attached to oil and gas leases in the area.

Elk appear to be the species most sensitive to vehicle use in the WSA. Current vehicle restrictions, developed in cooperation with the Montana Department of Fish, Wildlife, and Parks, limit vehicle use to the main East Fork road which is open from May 16 to November 30 of each year. Under this alternative, the entire area, including the East Fork road, would be closed year-round to all motor vehicle use, including snowmobiles.

Geology and Minerals

Based on existing information as discussed in Chapter 1, the East Fork of Blacktail Deer Creek WSA has only limited potential for both locatable and leasable minerals. Therefore, this alternative would have only a minimal impact on minerals.

Livestock Grazing

There would be no significant impacts to proposed range improvements or stocking levels. The closure of the East Fork road could adversely affect operations of the grazing permittee.

Timber Management

As shown in Table 30, the evaluation of the study area timber shows a negative present net worth for both EAUs at discount rates of 4% and 7-3/8%:

TABLE 30

SUMMARY OF PRESENT NET WORTH OF TIMBER

EAST FORK

EAU	PNW at Discount Rate of 4%	7-3/8%
1	$-481,499	$-589,307
2	-3,875	-9,577

In the short run, timber harvest in this area is restricted in the present Dillon MFP by other resource priorities—elk habitat in particular.

The potential harvest volume forgone in the long run is shown in Table 31.

This alternative will not change the potential of the land for forest growth. Ingrowth will approximately equal mortality. As long as the area remains wilderness, the removal of forest products is not possible.

Alternative EF-2, No Wilderness

Current Management Direction

Management under the current MFP consists of the following:

—Maintain the area in an essentially roadless condition.

—Allow no timber harvest.

—Restrict vehicle travel to protect wildlife habitat.

—Allow no surface occupancy on mineral leases.

—Reconstruct the East Fork road to mitigate existing erosion problems.

—Permit only a low level of change in visual resources in most of the area (VRM Class II) except for the northern and western edges, where significant change will be allowed (VRM Class IV).

--Consider the East Fork as an ACEC.

Nonwilderness management beyond the current MFP is likely to be substantially the same, as timber and mineral values are not considered high.

Wilderness

The East Fork unit will likely remain essentially roadless, with substantial restrictions on major development activities. Therefore, it should retain, to a large degree, its present wilderness characteristics, depending at least partially on the final ACEC decision. However, any future timber removal, road construction, or mineral development would have a significant adverse affect on the area's wilderness characteristics and special features.

Recreation

At least in the short term, motor vehicle access would continue to be limited to the main East Fork road in the summer and fall. Existing primitive recreation opportunities would not be adversely affected if current management is continued.

Visual Resources

The majority of the unit would be managed as VRM Class II. The existing, outstanding scenic quality would be substantially retained, at least in the short term.

TABLE 31

TOTAL POTENTIAL HARVEST VOLUME/DECADE (MBF)
EAST FORK

Decade	1	2	3	4	5	6	7	8	9	10
Volume (Tractor Logged Areas)	66	94	94	229	229	291	291	291	266	266
Volume (Cable Logged Areas)	417	572	572	596	596	640	640	640	386	386
Total Volume (All EAUs)	483	666	666	825	825	931	931	931	652	652

Wildlife

Current management direction, characterized by no timber harvesting, no surface occupancy on oil and gas leases, and motor vehicle restrictions, seeks primarily to protect important wildlife habitat. However, the current MFP also calls for the reconstruction of the main East Fork road, to correct existing erosion problems. This could result in some impact on wildlife habitat and, indirectly, wildlife populations by making access easier for hunters. Long-term protection is not guaranteed under this alternative as it would be with wilderness designation.

Geology and Minerals

Under this alternative the current stipulations placed on oil and gas leases to protect wildlife would continue, at least over the short term. Mining operations would still be regulated to prevent unnecessary and undue degradation of the land.

Livestock Grazing

Range improvements and stocking levels would be based on the Mountain Foothills EIS, and would not differ significantly from that under the wilderness alternative for this WSA.

Timber Management

Over the short term, timber harvesting would continue to be prohibited according to current management direction. In the long term, this direction could change and some or all of the timber could be made available for harvest.

HIDDEN PASTURE CREEK, MT-076-022

Alternative HP-1, All Wilderness

Wilderness

The designation of the Hidden Pasture WSA as wilderness would benefit the diverse wildlife habitats in the area—those of mule deer, elk, antelope, sage grouse, and, in the future, reintroduced bighorn sheep—and would add an example of the sagebrush steppe ecosystem, a relatively underrepresented type, to the wilderness system. Wilderness designation would also aid in long-term management of sensitive watershed values and important cultural resources.

The area's values of naturalness and solitude/primitive recreation are relatively low and would add little to the national system. In addition, the possible benefits of designation would be offset by manageability problems. The predominance of pre-FLPMA oil and gas leases, and the area's potential for exploration and development, virtually assure some potentially impairing impacts. The WSA's poor configuration and location in open terrain sloping toward nonwilderness lands to the west would make it difficult to protect the unit from the effects of future, off-unit development. The irregular boundaries would make inadvertent trespass a problem, and grandfathered rights of maintaining the relatively large number of range improvements using motorized equipment would make management for a primitive experience somewhat difficult. The state inholding would also present a management problem concerning offsite sights and sounds and nonconforming uses, but acquisition of the section would eliminate this problem. However, effective management of all, or

any part, of the WSA as wilderness would be extremely difficult.

Recreation

The four interior vehicle routes currently open to travel in summer and fall would be closed under this alternative. Therefore, it would have a slightly adverse effect on motorized recreation, and a corresponding slight benefit for primitive recreation. Oil and gas activity allowable under this alternative could have a major adverse impact on primitive recreation if extensive development occurred.

Visual Resources

The entire WSA would be managed as VRM Class I, and existing scenic values would be preserved.

Wildlife

This alternative would result in additional protection of forage and vegetative cover essential for big game and upland game birds. Restrictions on vegetative manipulation projects such as the sagebrush spraying which occurred in the past, would particularly benefit the antelope and sage grouse populations.

This alternative also would be intrinsically more compatible with the introduction of bighorn sheep, although most management constraints needed to accommodate the introduction could still be applied without wilderness designation. Wilderness designation would guarantee the long-term continuation of these management directions.

Existing management direction restricts motor vehicles to four designated routes which are open from May 16 to November 30 each year in order to protect elk and deer winter range. Under wilderness designation these four routes would be closed altogether. This could reduce future deer harvest which would be detrimental to the population.

Oil and gas exploration could still have some impact on wildlife habitat under this alternative since none of the leases have a wilderness protection stipulation. However, stipulations could be attached to at least partially mitigate these impacts.

Geology and Minerals

Based on existing information as discussed in Chapter 1, the Hidden Pasture area has limited potential for most mineral resources. Oil and gas potential however, is relatively high.

Since all oil and gas leases in the WSA are pre-FLPMA, any development on these leases could legally impair wilderness suitability. For this reason, the impact of this alternative on minerals would be minimal.

Livestock Grazing

There would be no significant impacts to proposed range improvements or stocking levels.

Alternative HP-2, No Wilderness

Current Management Direction

Management under the current MFP includes the following:

—Restrict vehicle access for wildlife habitat protection.

—Permit significant change in visual resources in most of the WSA (VRM Class IV), but only minor change in the eastern portion near Hidden Pasture Creek (VRM Class II).

A habitat management plan for bighorn sheep has been approved, and a reintroduction will occur within two years. A road was proposed for forest management in the eastern "leg" of the unit, but the timber analysis in this report has indicated that in all probability, no timber management will occur in the area. Currently, there is geophysical work being conducted in the area. With the area's known potential and the current activity, it is likely that some oil and gas exploration and possible development will occur. Due to the nature of the leases in the area, this could occur whether or not the WSA is designated as wilderness.

Wilderness

Adverse impacts to special features—particularly wildlife habitat—would occur if there were substantial oil and gas activity in the area. However, there is little difference in the wilderness and nonwilderness alternatives in this regard. A nonwilderness decision would not be detrimental to the goal of ecosystem representation or to the goal of providing quality areas to add to the wilderness system. There are several highly qualified candidate areas under BLM management that contain the sagebrush steppe type, and the quality of the Hidden Pasture WSA's wilderness characteristics is rather low.

Recreation

Vehicle travel restrictions would continue, at least in the short term, and current levels of recreation opportunities would continue. Any future extensive oil and gas activity could have a short-term adverse impact on all forms of recreation, with a possible long-term benefit to motorized recreation.

Visual Resources

Under current management direction, most of the unit, consisting of Class A, B, and C visual resources, would be managed to allow substantial change. The eastern portion, primarily Class A scenery, would be managed to allow only minor change.

Wildlife

No timber harvesting is currently planned for this area. However, if this decision were changed in the future, there would be a loss of security cover for wildlife.

In the short term, no vegetative manipulation projects are planned for this area. However, in the long term, if vegetative manipulation projects such as those which occurred in the past were to take place, they could have a detrimental impact on mule deer and sage grouse. The current habitat management plan for this area contains the necessary management direction to accommodate the proposed bighorn sheep introduction and the current road closures offer adequate habitat protection. This management direction could change over the long term if this area is not designated as wilderness.

There would be no difference between this alternative and the all wilderness alternative with respect to the impacts of oil and gas exploration.

Geology and Minerals

There would be no impact on minerals development or exploration. They would continue to be regulated to prevent unnecessary and undue degradation of the land.

Livestock Grazing

Range improvements and stocking levels would be based on the Mountain Foothills EIS, and would not differ significantly from those in the all wilderness alternative for this WSA.

BELL AND LIMEKILN CANYONS, MT-076-026

Alternative BL-1, All Wilderness

Wilderness

Primitive recreation quality and inclusion of three basic ecosystems are positive qualities the unit would add to the wilderness system, but the area's naturalness and carrying capacity/solitude would add little to the system. Wilderness designation would aid in long-term preservation of significant special features such as scenic values and undisturbed, excellent mule deer habitat. However, effective management of the WSA as wilderness would be extremely difficult. The inholding in Bell Canyon, very poor configuration, irregular legal boundaries, and pre-FLPMA oil and gas leases are major problems. Acquisition of the inholding would alleviate one of the problems, but the other major considerations would remain. Currently, there is a pending application for exploratory oil and gas drilling in the area. The area's known potential makes further exploration and development activity likely, which could take place even if it would impair wilderness values.

Recreation

Primary vehicle routes that would be closed to vehicle use include the ridge route and short dead end routes up the main canyons. While motorized recreation use is relatively light, this alternative would adversely affect such use, particularly during the big game hunting season. This alternative would enhance primitive recreation opportunities somewhat, although oil and gas development allowable under pre-FLPMA leases could severely restrict these opportunities.

Visual Resources

The entire WSA, consisting primarily of Class A scenery, would be managed as VRM Class I, allowing preservation of existing visual resources.

Wildlife

Restrictions on timber harvesting would be beneficial by ensuring the long-term maintenance of security cover. Vehicle restrictions could result in an inadequate deer harvest, which would be detrimental to the deer population. Oil and gas activities could have a detrimental impact on deer and elk, especially on their winter range in the western portion of the area. These impacts could occur with or without wilderness designation.

This WSA also has potential for the reintroduction of bighorn sheep, although there are no such plans at present. Wilderness designation would ensure the maintenance of this habitat.

Geology and Minerals

Based on existing information as discussed in Chapter 1, the Bell-Limekiln WSA has only limited potential for locatable minerals but has high potential for oil and gas.

Oil and gas leases in the WSA are both pre- and post-FLPMA and would have slightly different standards for what might be allowed on the leases as discussed in an earlier section.

Thorium is the only critical mineral found in this WSA. Because of the small size and low grade of the thorium deposits, it is unlikely that it could make any significant contribution to domestic supplies of thorium.

Livestock Grazing

The prescribed burn proposed for a 400-acre area in the Medicine Lodge Allotment would probably be prohibited if this WSA is designated wilderness. The purpose of the burn is to improve range condition, and not primarily to increase AUMs. There would be no change in the AMP and essentially no short- or long-term loss in

livestock AUMs if the area were not burned. Range condition, however, would remain static at fair to good, while it would probably improve to good to excellent with the burn. Some flexibility in range management would be lost without the burn. There would be no impacts to stocking levels, and no further impacts to proposed range improvements under this alternative.

Timber Management

Economic evaluation of the study area shows a negative present net worth through the first rotation as shown in Table 32.

TABLE 32
SUMMARY OF PRESENT NET WORTH OF TIMBER
BELL AND LIMEKILN

EAU	PNW at Discount Rate of 4%	7-3/8%
1	$-114,014	$-121,504
2	-15,294	-5,345

In the short run, timber harvest is unlikely for economic reasons. In the long run, the potential harvest volume shown in Table 33 is forgone.

In the long run, the proposed action will not change the potential of the land for forest growth. Ingrowth will approximately equal mortality. As long as the area remains wilderness, the removal of forest products is not possible.

Alternative BL-2, No Wilderness

Current Management Direction

Current, specific management direction consists of the following:

—Protect "Wedding Ring Rock," a feature of geological interest.

—Permit moderate changes in visual resources due to management activities (VRM Class III).

A road has been proposed up Bell Canyon for timber management. Timber management is not likely in the area at the present, but could occur some time in the future. Currently, there is oil and gas exploratory drilling about to get underway on the main ridge west of Bell Canyon. More oil and gas activity is likely, and this could occur whether or not the area was designated as wilderness, due to the nature of the leases. Access across the WSA has been sought by the owner of the private inholding for timber harvest on the private land, and by an adjacent landowner as the preferred route to his private land.

Wilderness

Adverse impacts to primitive recreation opportunities, naturalness, and special features such as wildlife habitat and scenic values would occur with significant oil and gas activity, any future timber harvest and road construction, and constructed access to the private inholding. The oil and gas activity, however, would proceed under either this or the wilderness alternative. As the quality of the area's wilderness characteristics is only low to moderate and its manageability as wilderness is highly doubtful, this alternative would not represent a significant loss to the national wilderness system.

Recreation

The system of vehicle travel routes in the WSA would remain open. Oil and gas development, and any future timber activity, would likely severely restrict primitive recreation opportunities. Oil and gas activity would probably have adverse effects on motorized recreation in the short term, but could enhance these opportunities over the long term.

Visual Resources

Under current management direction, the entire WSA, primarily consisting of Class A scenery, would be managed to allow moderate changes in visual resources.

TABLE 33
TOTAL POTENTIAL HARVEST VOLUME/DECADE (MBF)
BELL AND LIMEKILN

Decade	1	2	3	4	5	6	7	8	9	10
Volume (Tractor Logged Areas)	31	57	57	116	116	149	149	149	149	149
Volume (Cable Logged Areas)	39	74	74	117	117	303	303	303	303	303
Total Volume (All EAUs)	70	131	131	233	233	452	452	452	452	452

Wildlife

Although it is not presently economical to harvest timber in this WSA, proposals for roads into the area for timber management suggest that there is interest in the area and if economic conditions change, timber harvesting could take place. If this were to occur, it could have a negative impact on big game through the removal of security cover and the disruption of big game movement and use patterns. Similar impacts from oil and gas exploration or development could occur either under this alternative or the all wilderness alternative.

Geology and Minerals

There would be no impact on minerals exploration and development. These activities would still be regulated to prevent unnecessary and undue degradation of the land.

Livestock Grazing

Grazing management would be based on the Mountain Foothills EIS, and there would be no impacts on proposed range improvements or stocking levels.

Timber Management

There would be no impact in the short run. At present, the cost of road development and existing stumpage values prevent serious sales planning in the area. The area would be reevaluated periodically for future inclusion in the allowable cut base.

HENNEBERRY RIDGE, MT-076-028

Alternative H-1, All Wilderness

Wilderness

Designation of Henneberry Ridge WSA as wilderness would add an example of a natural-appearing, relatively low elevation sagebrush steppe ecosystem that is relatively underrepresented in the wilderness preservation system. This area would also add to the system's diversity as the WSA has a relatively long snow-free season of use. There is also some diversity within the WSA itself, as this alternative would designate as wilderness the scenic timbered ridges on the south and west that would be recreation attractions in the area. Wilderness designation would aid in long-term management of important deer and antelope habitats, which are special features of this area.

The unit's size and somewhat poor configuration, however, limit the solitude/recreation potential, and contribute to management problems. Areas on the east and west would present management difficulties due to narrow configuration. On the south, the location of a small portion of the unit on a slope facing extensive nonwilderness lands and irregular legal boundaries are also potential problems. Pre-FLPMA oil and gas leases would raise long-term manageability questions although currently the possibility of major developmental impacts appears low. While this WSA would add somewhat to the diversity of the wilderness system, effective management as wilderness would be somewhat difficult. If the oil and gas leases were ever developed, the primary wilderness value of the area—as a natural steppe type—could easily be impaired.

Recreation

The limited motorized recreation opportunities in the WSA would be forgone. However, there would be no real enhancement of the limited primitive recreation opportunities either.

Visual Resources

The entire WSA, consisting of Class B scenery, would be managed as VRM Class I, and existing values would be preserved.

Wildlife

Key deer and elk winter range on the south and west portions of the WSA would be protected over the long term by wilderness designation. There is good nongame bird habitat along Grasshopper Creek which would be maintained through wilderness designation as well. Restrictions on sagebrush burning could be beneficial to deer and elk by maintaining habitat diversity.

Geology and Minerals

Based on existing information as discussed in Chapter 1, the WSA has good potential for small deposits of gold and possibly silver in the northwest portion of the unit, and for placer gold along Grasshopper Creek (see the Henneberry Mineral Potential map).

Potential for oil and gas and phosphate is limited based on existing information. All of the areas with potential for gold and silver would be inside the area recommended for wilderness. If these deposits are not explored or developed before the area is designated as wilderness, or December 31, 1983, whichever is later, any potential could be forgone over the long term.

Livestock Grazing

The proposed prescribed burn for the Rocky Hills Allotment would probably be prohibited if the area were designated wilderness. The AMP could be implemented without the burn, but an increase of approximately 30 livestock AUMs per year would be forgone.

The proposed complex of improvements in the Rocky Hills Allotment, consisting of a well and windmill, 3 miles of pipeline, nine troughs, and 3 miles of fence to separate pastures, would likely be prohibited due to cumulative impacts in the core area of the WSA if it were designated wilderness. These improvements are critical to implementation of the alternate rest grazing system proposed for the allotment, and no reasonable substitutes for them which would have less of an impact on wilderness values are possible. Without the proposed management system, a long-term increase of 611 AUMs per year would be forgone, and the 5,400 acres of the allotment in critical erosion condition would probably not improve significantly.

Alternative H-2, No Wilderness

Current Management Direction

Current specific management direction is limited. Extensive range improvements are proposed for the central "core" portion of the WSA, and the entire WSA is to be managed as VRM Class IV, permitting significant changes to the area's visual resources. There is some possibility of oil- and gas-related development in the area, and the mineral evaluation suggests that some hardrock mining could take place in the northern and northwestern portions. The oil and gas activity would not differ significantly under any of the alternatives considered here due to the nature of the leases.

Wilderness

The area's primary wilderness value—as a natural prairie or steppe—would be impaired by the proposed range improvements, and possibly by any future oil and gas activity if it took place in the central portion of the WSA. Oil and gas activity, and possibly livestock competition, would adversely affect the supplementary value of wildlife habitat in the area. There are other qualified candidates for the wilderness system which could represent a natural-appearing sagebrush steppe, although the core area of this WSA is a good example.

Recreation

Limited motorized recreation opportunities would continue. The limited primitive recreation opportunities would be affected by range management activity and possibly oil and gas activity.

Visual Resources

Under current management the entire WSA would be managed to allow substantial change in the existing Class B visual resources.

Wildlife

There would not be many significant short-term impacts to wildlife, but long-term protection would not be guaranteed. One short-term impact would be the proposed sagebrush burn, which would reduce habitat diversity and be detrimental to deer and elk.

Any mineral development could disrupt elk, deer and antelope movements, and use patterns.

Geology and Minerals

There would be no impact on minerals. However, exploration and development would still be regulated to prevent unnecessary and undue degradation of the land.

Livestock Grazing

Grazing would be managed according to the Mountain Foothills EIS, and there would be no impacts to the proposed range improvements and stocking levels.

Alternative H-3, Partial Wilderness

Wilderness

Alternative H-3 would improve manageability of the WSA by eliminating narrow configuration concerns in the east and west, and by placing unit boundaries primarily on identifiable features.

On the east, manageability could be improved by acquiring the protruding state section and establishing the boundary on a north-south ridgeline through it. This alternative also would reduce the number of man-made features in the WSA slightly, and eliminate near views of the power line on the southeast. This alternative would retain the central sagebrush steppe, but eliminate most of the area's diversity and, by significantly reducing its size, reduce its carrying capacity and potential for solitude. Opportunities for primitive recreation would be reduced, as the timbered ridges, a primary recreation attraction, would not be within the area recommended for wilderness. The WSA would retain its value of providing ecosystem diversity in the wilderness system, but effective long-term management of the area as wilderness would remain questionable due to the potential for impairing oil and gas activity under pre-FLPMA leases.

There would be fewer multiple resource benefits than under Alternative H-1, All Wilderness, since the most scenic terrain and much of the important deer and elk habitat would be recommended for nonwilderness.

Recreation

The vehicle ways in the central portion of the unit would remain in the recommended area and would not be available for motorized use, although ways on the west and south would continue to be open for use.

Visual Resources

The portion of the WSA recommended for wilderness would be managed to preserve existing visual resources, and the area recommended for nonwilderness would be managed to allow substantial change, at least in the short term.

Wildlife

This alternative would exclude a large portion of the deer and elk winter range from the area that would be designated as wilderness. Therefore, the long-term protection of this habitat would not be guaranteed. Much of the nongame bird habitat along Grasshopper Creek would be maintained by this alternative. The prescribed burn could take place under this alternative and would be detrimental to deer and elk.

Geology and Minerals

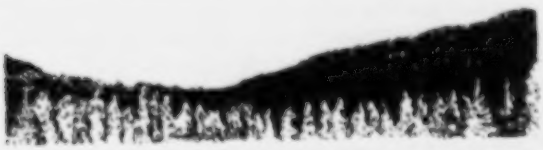
The partial wilderness alternative would remove much of the area with highest mineral potential from wilderness consideration. Much of the area along Grasshopper Creek would remain in the WSA. Other potential impacts are adequately covered in the discussion under Alternative H-1, All Wilderness.

Livestock Grazing

None of the Bannack Allotment would be within the area proposed as wilderness, but 5,545 acres (33%) of the Rocky Hills Allotment, including most of two of the four proposed pastures, would be within the area.

The area proposed for prescribed burning would be outside the area recommended for wilderness, and the burn would be allowed. The complex of improvements proposed in the Rocky Hills AMP would probably be prohibited. As described under Alternative H-1, a long-term increase of 611 livestock AUMs per year would be forgone, and the 5,400 acres of the allotment in critical erosion condition would probably not improve significantly.

FARLIN CREEK, MT-076-034



Alternative F-1, All Wilderness

Wilderness

This alternative would add some diversity and physiographic unity to the larger FS area. The boundary configuration, however, would be irregular, and the recommended area would include a large number of mining claims which, if developed, would make management of the area as wilderness somewhat difficult. The lower portion of Farlin Creek would include some human imprints which have moderate impacts on the WSA's natural character.

Recreation

This alternative would adversely affect the relatively small amount of current motorized recreation use chiefly associated with hunting. It would benefit primitive recreation in this small WSA, but these benefits would be small in comparison with the existing opportunities in the larger FS roadless area.

Visual Resources

The entire WSA would be managed as VRM Class I, and existing scenic values would be preserved.

Wildlife

Important elk and deer spring-fall habitat would be protected from surface-disturbing activities such as timber harvesting. Ecological diversity of the area, which is important for wildlife, would be maintained.

Geology and Minerals

The Farlin Creek WSA has good potential for silver, gold, and possibly tungsten (see the Farlin Creek Mineral Potential map). Both silver and tungsten are considered to be critical minerals. It is unknown at this time whether the occurrences in this WSA have the potential to make a significant contribution to the national supply of these two minerals. However, if the deposits are not explored or developed before December 31, 1983, or the date of wilderness designation, whichever is later, any potential would be forgone over the long term.

Potential for oil and gas and phosphate is limited based on existing information.

Livestock Grazing

Allotments, AUMs, and range improvements within the area recommended for wilderness would be as described in Chapter 1. There would be no significant impacts to improvements or stocking levels.

Timber Management

Study area timber evaluations show a positive present net worth of $31,494 at a 4% discount rate. The PNW at 7-3/8% is slightly negative ($-2,653). The area would be easy to log.

The potential sustained yield harvest in this WSA is approximately 410 mbf per decade. Given the probable harvest schedule shown in Table 34, the total board feet of timber forgone over a 100-year period is about 2.5 mmbf.

In the long run the proposed action will not change the potential of the land for forest growth, assuming no change in productivity and ingrowth equaling mortality. As long as the area remains wilderness the removal of forest products is not possible.

TABLE 34
TOTAL POTENTIAL HARVEST VOLUME/DECADE (MBF)
FARLIN CREEK

Decade	1	2	3	4	5	6	7	8	9	10
Volume	0	0	0	246	246	410	410	410	410	410

Alternative F-2, No Wilderness

Current Management Direction

The current MFP proposes roads up Farlin and Steel creeks for timber management, and permits moderate change in visual resources in the entire WSA (VRM Class III). Likely future activities include timber harvest and associated road construction in the central portion of the unit, and mining activity in the Steel Creek area and in the northern portion where the Polaris claim group overlaps the unit.

Wilderness

Under this alternative, the FS East Pioneer area would retain its original, somewhat irregular legal boundary. Mining activity would likely cause impairing impacts in the Steel Creek area, and the timbered ridge in the central part of the WSA would probably be developed for timber management. This would result in impacts on wilderness characteristics and on scenic values seen from the FS unit.

Recreation

Current motorized recreation use would continue. Primitive recreation opportunities in the WSA would be adversely affected by road construction and timber harvest, and probably, to a lesser degree, by hardrock mining. Those opportunities associated with the portion of the larger roadless area around Baldy Mountain could be slightly adversely affected by timber management activity on adjacent BLM land.

Visual Resources

Moderate changes in visual resources, which are about equally divided between A and B scenic quality classes, would be allowed, given current management direction.

Wildlife

Current management direction for this area proposes roads for timber harvesting and mining access. It is probable that some harvesting would take place in the future. Together, the impacts of timber harvesting and road development would open up the area and create a disturbance sufficient to disrupt elk movements and use patterns.

Geology and Minerals

There would be no impact on minerals. Existing regulations to prevent unnecessary and undue degradation of the land would continue.

Livestock Grazing

There would be no significant impacts to improvements or stocking levels.

Timber Management

The area would be available for the harvest of forest products. Current management direction makes such harvest in the future a likely possibility.

The potential harvest forgone under Alternative F-1, about 0.4 mmbf/decade, would be available.

Alternative F-3, Partial Wilderness

Wilderness

Alternative F-3 would provide a more manageable boundary for the East Pioneer unit and would retain the physiographic unity of the larger unit. Most of the lower foothills would be eliminated from the area recommended for wilderness. This alternative would eliminate the major impacts to naturalness in the WSA, and would enhance manageability by eliminating most of the mining claims within the WSA.

Recreation

Motorized recreation would be slighty adversely affected, but access routes up Farlin and Steel creeks would remain open, and the through route to the Silver King mine area would remain open. Primitive recreation in the area not recommended for wilderness could be adversely affected by minerals and timber activity.

Visual Resources

The area recommended for wilderness, primarily consisting of Class A scenic values, would be managed as VRM Class I and existing values preserved. The area recommended for nonwilderness, primarily Class B, would be managed to allow moderate change under current management direction as VRM Class III.

Wildlife

Wildlife habitat values would be protected over a portion of the WSA. Roughly 75% of the deer winter range and 20% of the elk and deer spring-summer-fall range would not be within the area recommended for wilderness under this alternative. For those portions not recommended for wilderness the impacts would be the same as for Alternative F-2 and for those portions recommended for wilderness the impacts would be the same as for Alternative F-1.

Geology and Minerals

Some of the area with high potential for gold, silver, and possibly tungsten would be inside the area recommended for wilderness designation. The impacts in this area would be the same as for Alternative F-1. Impacts on the remainder of the area would be the same as for Alternative F-2.

Livestock Grazing

There would be no impacts to improvements or stocking levels.

Timber Management

All of EAU 2 and about 25% of EAU 1 would be outside of the area recommended for wilderness designation. Although the present net worth of this timber would still be positive, it would be so small and the volume so low that it would make any sale unattractive to potential bidders. The overall result in all probability would be the same as for the all wilderness alternative.

AXOLOTL LAKES, MT-076-069

Alternative AX-1, All Wilderness

Wilderness

The diversity and significant special features within this relatively small unit, with associated recreation opportunities are positive qualities the WSA would add to the wilderness preservation system. Multiple resource benefits of wilderness designation are probable long-term benefits to important wildlife, sensitive soils and significant visual and cultural resources. Apparent naturalness, however, is rather low and would detract from these qualities. Relatively poor configuration, inholdings, an existing vehicle access route, and mining claims in the western portion would pose management problems ranging from moderate to significant.

Recreation

This alternative would adversely affect motorized recreation opportunities. The stock driveway/vehicle way and the open route in the southeast portion—used primarily during hunting season—would be closed if the area were designated wilderness. Snowmobile use, a popular activity in the area, would be prohibited. The northwestern part of the WSA, designated as open under the existing travel plan, would also be closed. Primitive recreation opportunities, however, would benefit from closure of the area to motorized vehicles, especially winter use such as skiing and snowshoeing.

Visual Resources

The entire WSA would be managed as VRM Class I, and existing scenic values, predominantly Class A, would be preserved.

Wildlife

This alternative would provide long term protection for the unique wildlife values of this area. Current management direction provides protection for the axolotl salamander through motor vehicle restrictions and the exclusion of livestock grazing around Blue Lake. Wilderness designation would guarantee the continuation of this protection over the long term. The prohibition of timber harvesting would protect security cover for deer and elk and avoid disturbances which could cause a disruption in movement and use patterns. Important sharp-shinned hawk and goshawk habitat would be protected.

Restrictions on mineral development would have a beneficial effect on wildlife by protecting existing security cover and widlife use patterns.

Geology and Minerals

The WSA has good potential for gold in the western part of the WSA as identified on the Mineral Potential map.

Potential for oil and gas and other leasable minerals is very limited based on existing information. The potential of any deposits which are not explored or developed before December 31, 1983, or the date of wilderness designation, whichever is later, would be forgone over the long term.

Livestock Grazing

There would be no significant impacts to proposed range improvements or stocking levels.

Timber Management

As explained in Chapter 1, the timber in this WSA has a present net worth of $391,476 at a 4% discount rate, and $40,290 at a 7-3/8% discount rate.

The potential sustained yield harvest from this WSA is approximately 2,842 mbf per decade. Given the probable harvest schedule shown in Table 35, the total board

TABLE 35
TOTAL POTENTIAL HARVEST VOLUME/DECADE (MBF)
AXOLOTL LAKES

Decade	1	2	3	4	5	6	7	8	9	10
Volume (Tractor Logged Areas)	820	1,976	2,005	2,173	2,173	2,173	2,173	2,173	2,173	1,377
Volume (Cable Logged Areas)	387	499	559	669	669	669	669	669	669	338
Total Volume (All EAUs)	1,207	2,475	2,564	2,842	2,842	2,842	2,842	2,842	2,842	1,715

feet of timber that would be forgone over a 100-year period is about 25 mmbf.

Over the short term, approximately 2,200 acres of this area are closed to timber harvesting to protect wildlife, watershed, and recreation values. Therefore, the short-term impact of wilderness designation is not great. Over the long term, however, the entire potential harvest listed above would be forgone as a result of wilderness designation. This alternative will not change the potential of the land for forest growth. Ingrowth will approximately equal mortality.

Alternative AX-2, No Wilderness

Current Management Direction

Current management direction for the Axolotl Lakes WSA consists of the following:

—Consider 5,440 acres—all of the WSA except the southwest and extreme west portions—as an ACEC for its wildlife, watershed and recreation values.

—Allow no timber harvest or surface occupancy on leaseable minerals on about 2,200 acres in the northeast portion in the lakes area.

—Restrict vehicle travel on all but about 1,000 acres (northwest portion) to protect wildlife habitat and watershed values.

—Exclude grazing around Blue Lake.

—Permit little deterioration of scenic quality in the northeast lakes area (VRM Class II), and moderate changes in visual resources in most of the remainder of the WSA (VRM Class III), except for the eastern portion where significant change will be allowed (VRM Class IV).

Additional mining activity in the western portion of the WSA and timber harvest in the east central and southeast portions are possible future activities.

Wilderness

Continued current management direction would substantially retain, and to a degree improve, wilderness characteristics and special features in the northeastern one-third of the WSA, in the vicinity of the lakes. Depending on final ACEC action and management, a larger area could retain these characteristics. However, it is likely that timber removal south of the lakes area and mining in the western portion would result in impairing impacts to wilderness qualities, though ACEC guidelines could be shaped to minimize effects on the area's special features, which are its primary wilderness values. Long-term management is uncertain, but could impair these values if considerable development were to take place.

Recreation

Primitive recreation opportunities would continue to be available off the open vehicle routes in the area, especially in the northeastern portion. Opportunities elsewhere in the unit could be affected by future mining or timber management. Motorized recreation opportunities in the area would continue to be limited to protect wildlife and watershed resources, at least in the short term.

Visual Resources

At least in the short term, the lakes area would be managed as VRM Class II, with only minor changes to existing scenic values permitted. The remainder of the area, primarily Class A, would be managed to allow moderate or substantial change, VRM Classes III and IV.

Wildlife

Current management direction for this area considers classifying 5,440 acres as an ACEC to protect unique wildlife values. This alternative would also restrict vehicle travel in all but 1,000 acres (northwest portion) to protect unique wildlife values. Livestock grazing would be excluded around Blue Lake to protect the habitat of the unique axolotl salamander. This management direction emphasizes maintaining the existing roadless condition, vegetative cover (including forested lands) and unique wildlife values of part of the WSA, and improving the wildlife habitat.

The protection under the existing MFP is only ensured over the short term, that is, the life of the current MFP.

Long-term protection is not guaranteed as it would be under wilderness designation.

Geology and Minerals

There would be no impact on mineral exploration and development. These activities would continue to be regulated to prevent unnecessary and undue degradation of the land.

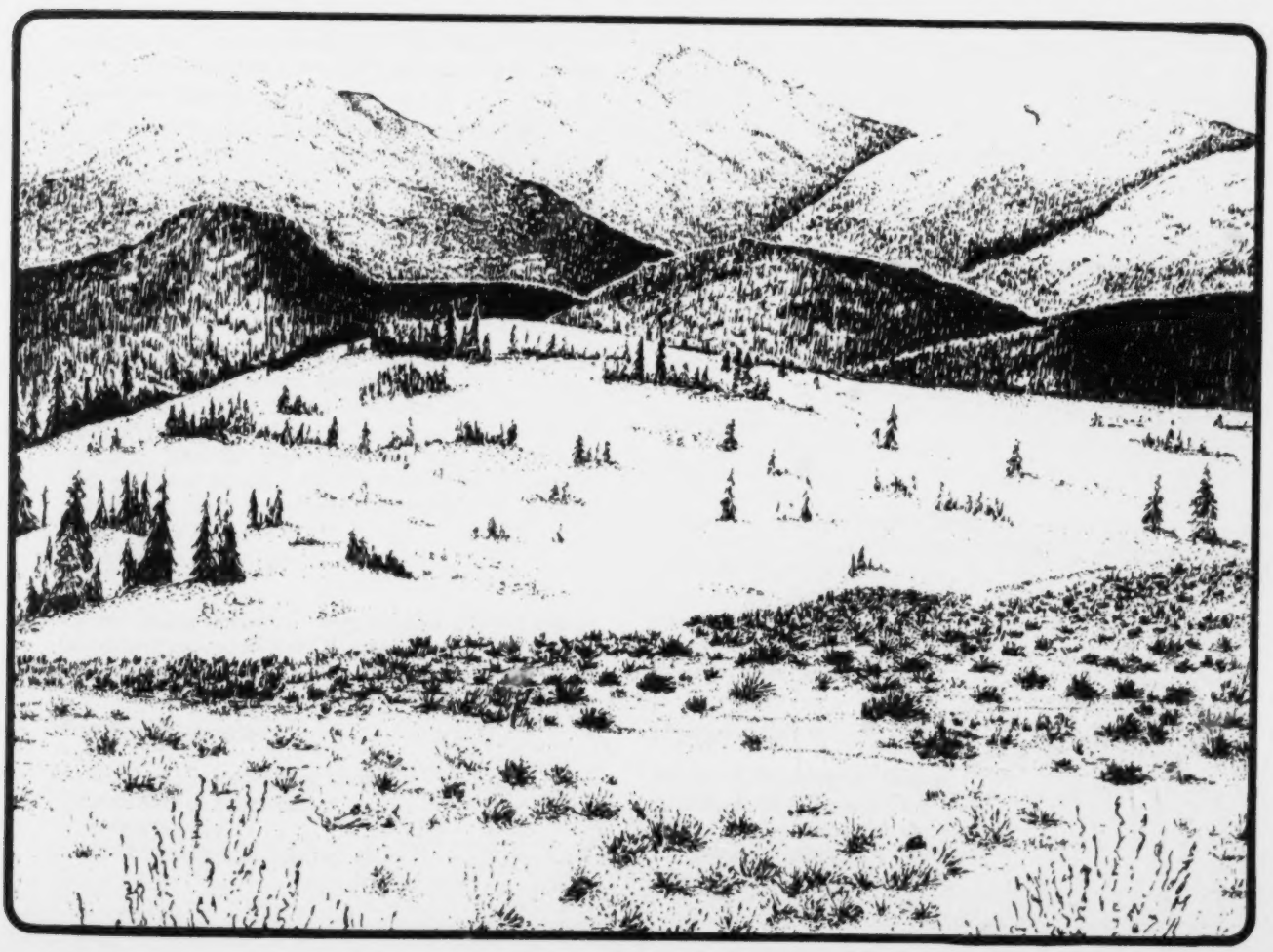
Livestock Grazing

Range improvements and stocking levels would be based on the Mountain Foothills EIS, and would not differ significantly from those under the all wilderness alternative for this WSA.

Timber Management

Over the short term, 2,200 acres are closed to timber harvesting and the remainder is available for harvesting over the long term. This situation could change and the entire WSA with a potential harvest of 2.8 mmbf/decade, could be made available for harvest.

Chapter 4
Consultation, Coordination, and Public Involvement



PROCESS

During the wilderness inventory process, (completed in March, 1980) that designated the eight WSAs covered in this report, there were two 90-day public comment periods. Comments were received from state and local governments, individuals, and organizations. These comments were used in the preliminary scoping and issue identification phase of the wilderness study process.

The initiation of this study process was announced in the Federal Register on May 7, 1981. Public meetings were held in Lima, Montana, on May 12, 1981, in Sheridan, Montana, on May 13, 1981, and Dillon, Montana, on May 14, 1981. A total of 63 people attended these meetings. Their purpose was to identify the major issues to be addressed in the study and to get comments on the proposed planning criteria contained in the draft Wilderness Study Procedures.

During May, June, July, and August of 1981, specific information on the mineral potential of each WSA was solicited from industry, local residents, mining claimants, universities, government agencies, mining associations, and other sources. The information received was used to determine mineral potential and to assess potential impacts.

State agencies were requested in December, 1981, to provide copies of relevant state level plans that the BLM should consider in this and other planning efforts.

Numerous contacts were made with the FS throughout the process. They were consulted about the relationship of BLM tack-ons to larger FS areas, and for assistance in using the FS economic analysis model for timber.

Following the release of this document, there will be a 64-day public comment period, with public hearings scheduled in Dillon and Sheridan, Montana. The recommendations of the Secretary of the Interior will become final 30 days after the final WPA/EIS is released to the public. During this 30-day period the public will have a chance to comment on the final recommendations.

DISTRIBUTION

Copies of this document have been sent to the following agencies and interest groups for their review and comment:

Federal Agencies

Council on Environmental Quality
Department of Agriculture
  Forest Service
  Soil Conservation Service
Department of the Army
  Corps of Engineers
Department of Energy
Department of the Interior
  Bureau of Mines
  Bureau of Reclamation
  Fish and Wildlife Service
  Geologic Survey
  National Park Service
Environmental Protection Agency
National Advisory Council For Historic Preservation

Congressional Offices

Office of Congressman Marlenee
Office of Congressman Williams
Office of Senator Baucus
Office of Senator Melcher

State Agencies

Bureau of Mines and Geology
Department of Commerce
Department of Fish, Wildlife, and Parks
Department of Health and Environmental Sciences
Department of Natural Resources and Conservation
Department of State Lands
Environmental Quality Council
Governor's Council on Natural Resources
Office of the Governor
State Historic Preservation Officer

County Commissioners and Planning Boards

Beaverhead County
Madison County

Businesses

Atlantic Richfield
Burlington Northern
Cyprus Industrial Minerals Company
F. H. Stoltze Land and Lumber Company
Janus Mining Company
Kramer Appraisal Service
Montana Power Company
Occidental Mineral Corporation
Pfizer Incorporated

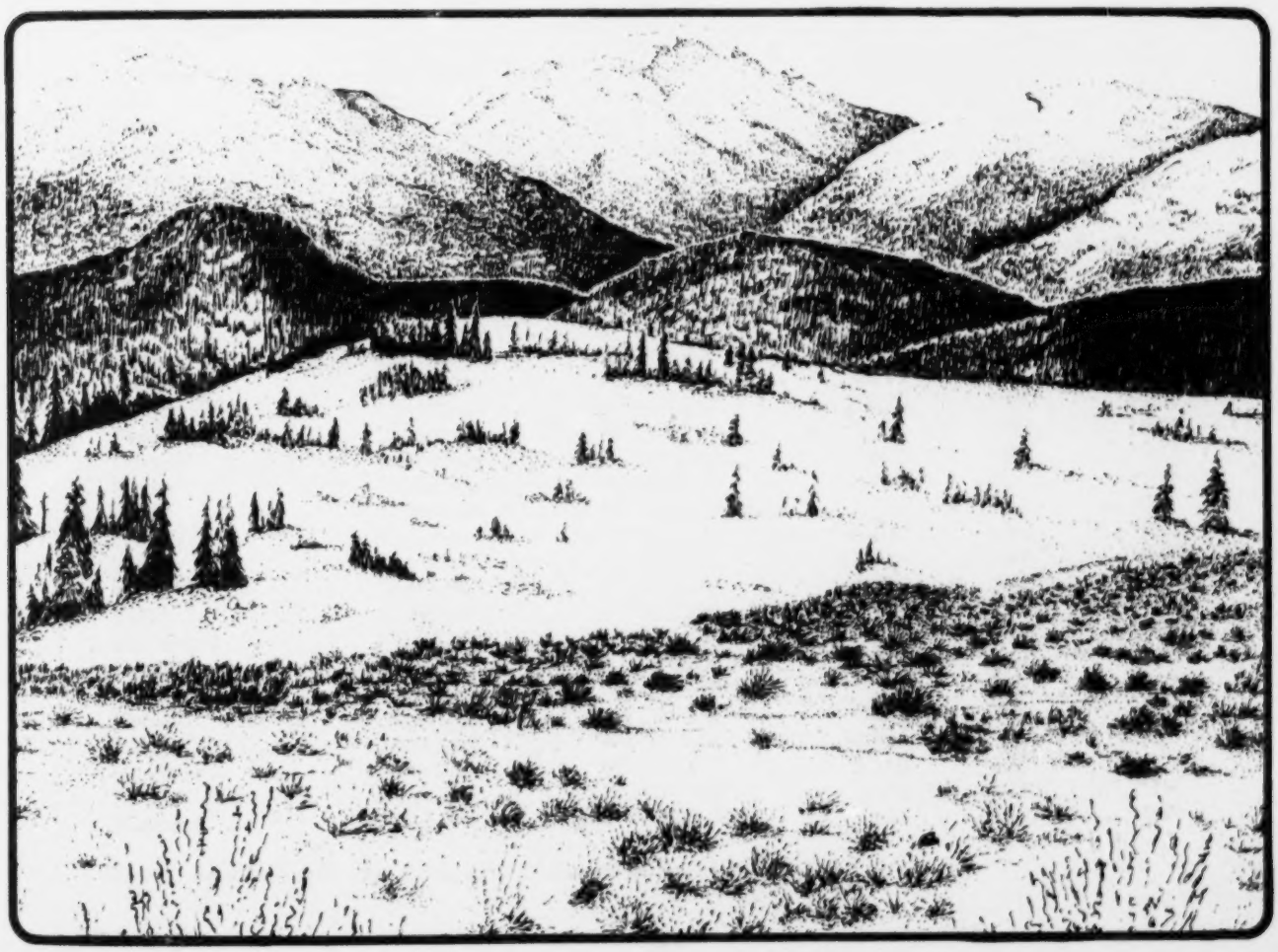
Organizations

American Wilderness Alliance
Anaconda Sportsmens Club
Back Country Horsemen of Missoula
Beaverhead Concerned Citizens
Beaverhead Snow Riders

Big Hole River Watershed Association
Center for Public Interest
Defenders of Wildlife
Dillon Chamber of Commerce
Environmental Information Center
Five Valleys Audubon Society
Friends of the Earth
Gallatin Wildlife Association
Inland Forest Resource Council
Madison Gallatin Alliance
Montana Association of Counties
Montana Association of Grazing Districts
Montana Cattlemen's Association
Montana Chamber of Commerce
Montana 4X4 Association
Montana League of Conservation Voters
Montana Mining Association
Montana Outfitters and Guides Association
Montana Petroleum Association
Montana Public Lands Council
Montana Snowmobile Association
Montana Stockgrowers Association
Montana Taxpayers Association
Montana Wilderness Association
Montana Wildlife Federati[illegible]
Montana Women for Tim[illegible]
Montana Wood Products Association
Northern Plains Resource Council
Rocky Mountain Oil & Gas Association
Sierra Club
Southwest Montana Stockgrowers Association
Western Environmental Trade Association
Wilderness Institute
Wilderness Society

In addition, copies of this document have been sent to numerous individuals, newspapers, and radio and TV stations.

Appendixes, Glossary, References and Index



APPENDIX A

SUMMARY OF WILDERNESS STATUS

TABLE A1
SUMMARY OF WILDERNESS STATUS THROUGHOUT MONTANA

a. Status of BLM Areas Under Study

County	BLM District	Unit Number	Total Acreage	Study Dates Start	Completion
Madison	Butte	MT-076-001	26,357	1981	1982
Beaverhead	Butte	MT-076-002	17,639	1981	1982
Beaverhead	Butte	MT-076-007	6,180	1981	1982
Beaverhead	Butte	MT-076-022	15,475	1981	1982
Beaverhead	Butte	MT-076-026	9,588	1981	1982
Beaverhead	Butte	MT-076-028	9,756	1981	1982
Beaverhead	Butte	MT-076-034	1,260	1981	1982
Madison	Butte	MT-076-063	860	1981	1982
Madison	Butte	MT-076-069	6,578	1981	1982
Madison	Butte	MT-076-079	1,509	1981	1982
Teton	Butte	MT-075-102	4,927	1980	1983
Teton	Butte	MT-075-105	3,085	1980	1983
Teton	Butte	MT-075-106	3,086	1980	1983
Teton	Butte	MT-075-107	196	1980	1983
Lewis and Clark	Butte	MT-075-110	595	1980	1983
Jefferson	Butte	MT-075-114	3,585	1980	1983
Jefferson	Butte	MT-075-115	5,976	1980	1983
Park	Butte	MT-075-133	53	1980	1983
Powell	Butte	MT-074-150	11,580	1982	1985
Powell	Butte	MT-074-151a	11,380	1982	1985
Powell	Butte	MT-074-151b	4,257	1982	1985
Granite	Butte	MT-074-155	520	1982	1985
Madison	Butte	Bear Trap Canyon[1]	4,015	Preliminary partial wilderness recommendation	
Silver Bow	Butte	Humbug Spires[1]	11,175		
Beaverhead	Butte	Centennial Mtns.[1]	30,030	Intensive inventory postponed	
Carbon	Lewistown	MT-067-205	3,955	1982	1984
Carbon	Lewistown	MT-067-206	12,575	1982	1984
Carbon	Lewistown	MT-067-207	4,470	1982	1984
Golden Valley	Lewistown	MT-067-212	6,870	1982	1984
Fergus	Lewistown	MT-068-244	5,230	1981	1982
Fergus	Lewistown	MT-068-246	7,855	1981	1982
Blaine	Lewistown	MT-060-250	4,700	1981	1982
Blaine	Lewistown	MT-060-253	12,000	1981	1981
Phillips	Lewistown	MT-060-256	36,200	1981	1982
Phillips	Lewistown	MT-065-266	12,340	1981	1982
Valley-Phillips	Lewistown	MT-065-278	15,000	1981	1982
Valley	Lewistown	MT-064-356	59,112	1982	1986
Garfield	Miles City	MT-024-633	3,480	1981	1982
Garfield	Miles City	MT-024-657	19,677	1981	1982
Garfield	Miles City	MT-024-675	5,650	1981	1982
Garfield	Miles City	MT-024-677	8,050	1981	1982
Prairie	Miles City	MT-024-684	44,515	1981	1982
Rosebud	Miles City	MT-027-701	8,440	1981	1984
Powder River	Miles City	MT-027-702	5,650	1981	1984
Rosebud	Miles City	MT-027-736	1,484	1981	1984

[1]Former designated primitive areas - under separate study procedures.

b. Statutory Wilderness (all agencies)

TABLE A1 (cont.)

Agency	County or Counties	Unit Name and Number	Unit Acreage
FS[2]	Carbon, Stillwater, Sweetgrass, Park	Absaroka-Beartooth, NF 106	920,377
FS	Granite, Ravalli, Deer Lodge, Beaverhead	Anaconda-Pintlar, NF 003	157,874
FS	Flathead, Teton, Lewis and Clark, Powell	Bob Marshall, NF 005	1,009,356
FS	Lincoln, Sanders	Cabinets, NF 010	94,272
FS	Lewis and Clark	Gates of the Mountains, NF 027	28,562
FS	Flathead	Great Bear, NF 107	286,700
FS	Lake, Missoula	Mission Mountains, NF 050	73,877
FS	Missoula	Rattlesnake, 1-801	20,000
FS	Lewis and Clark, Powell	Scapegoat, NF 073	239,296
FS	Ravalli	Selway-Bitterroot, NF 074	248,893
FS	Granite	Welcome Creek, NF 103	28,135
	Total FS	Number of areas = 11	3,107,342
FWS[3]	Beaverhead	Red Rock Lakes, WR-036	32,350
FWS	Sheridan	Medicine Lake, WR-027	11,800
FWS	Phillips	UL Bend, WR-047	20,847
	Total FWS	Number of areas = 3	64,997

[2]FS = Forest Service
[3]FWS = Fish and Wildlife Service

c. Recommendations Pending Before Congress (all agencies) TABLE A1 (cont.)

Agency	County or Counties	Unit Name	Unit Number	Unit Acreage
FS	Lincoln	Cabinet Face West	C 1670	8,250
FS	Sanders, Lincoln	Scotchman Peaks	A&B 1662	60,416
FS	Sanders	Cabinet Mountain Addition	C 1681	442
FS	Sanders	Chippewa Creek (Cabinet Mountain Addition)	1682	382
FS	Sanders	McKay Creek	B 1676	6,510
FS	Ravalli	Schley Mountain (Great Burn)	D 1301	12,600
FS	Ravalli	Hoodoo (Great Burn)	Q 1301	65,097
FS	Ravalli	Blodgett Canyon	1061	9,600
FS	Ravalli	North Fork, Lost Horse	1062	8,598
FS	Ravalli	Trapper Creek	1063	2,867
FS	Ravalli	Nelson Lake	1064	3,233
FS	Ravalli	Meadow Creek	M 1845	12,600
FS	Ravalli	Swift Creek	1065	700
FS	Ravalli	Needle Creek	1066	1,175
FS	Ravalli	Selway-Bitterroot Addition	S IBB	12,700
FS	Beaverhead	North Big Hole	B 1001	7,027
FS	Deer Lodge	Storm Lake	1427	6,065
FS	Granite	Quigg (Slide Rock)	Q 1807	60,050
FS	Beaverhead	West Big Hole	I 1943	56,462
FS	Beaverhead	East Pioneer (Torey Peak)	1008	87,746
FS	Madison, Gallatin	Lionhead	1963	20,899
FS	Madison, Gallatin	Spanish Peaks	NF 920	63,300
FS	Park	Republic Mountain (North Absaroka Addition)	1545	480
FS	Carbon	Lost Water	1362	9,500
FS	Rosebud	Tongue River	1373	16,600
FS	Missoula, Powell	Great Bear-Bob Marshall, Scapegoat-Swan	B 1485	3,825
FS	Powell, Lewis & Clark	Clearwater-Monture	Q 1485	65,385
FS	Lewis and Clark	Park Bridge	U 1485	3,255
FS	Lewis and Clark	Renshaw	W 1485	25,649
FS	Lewis and Clark	Leavitt Creek	T 1485	2,400
FS	Lewis and Clark	Silverking Falls Creek	F 1485	38,300
FS	Lewis and Clark	Big Log	W 1610	9,272
	Total FS	Number of areas = 34		681,812
FWS	Garfield	East Seven Blackfoot	FW 923-1	12,184
FWS	Phillips	Mickey Butte	FW 923-2	17,413
FWS	Phillips, Valley	Burnt Lodge	FW 923-3	22,976
FWS	Garfield	Billy Creek	FW 923-4	11,556
FWS	Garfield	West Seven Blackfoot	FW 923-5	7,096
FWS	Phillips	Antelope Creek	FW 923-6	5,382
FWS	Garfield	West Hill Creek	FS 923-7	11,896
FWS	Petroleum	Fort Musselshell	FW 923-8	8,303
FWS	Garfield	Sheep Creek	FW 923-9	12,424
FWS	Phillips	West Beauchamp	FW 923-10	6,736
FWS	Garfield	Wagon Coulee	FW 923-11	10,528
FWS	Petroleum	Alkali Creek	FW 923-12	6,692
FWS	Petroleum	Crooked Creek	FW 923-13	6,842
FWS	Garfield	East Hell Creek	FW 923-14	15,984
FWS	Garfield	East Beauchamp	FW 923-15	5,568
	Total FWS	Number of areas = 15		161,480
NPS[4]	Flathead, Glacier	Glacier	NP-915	917,600
NPS	Park, Gallatin	Yellowstone	NP-928	167,060
	Total NPS	Number of areas = 2		1,084,660

[4]NPS = National Park Service

d. Other Agency Areas Under Study

TABLE A1 (cont.)

Agency	County or Counties	Unit Name	Unit Number	Unit Acreage
FS	Lincoln	Ten Lakes	1683	33,885
FS	Lincoln	Mt. Henry	1666	21,000
FS	Ravalli	Blue Joint Mountain	A 1941	61,400
FS	Granite, Powell	Flint Range	1428	52,220
FS	Granite, Powell	Dolus Lake	1429	9,100
FS	Granite, Ravalli	Sapphires	1421	98,815
FS	Teton	Deep Creek	P 1485	26,068
FS	Teton	Reservoir North	H 1485	1,520
FS	Beaverhead	West Pioneer	1006	147,992
FS	Madison	Middle Mountain-Tobacco Roots	B 1013	36,640
FS	Jefferson, Broadwater	Bullock Hill	A 1620	59,980
FS	Jefferson, Broadwater	Casey Peak	E 1620	25,000
FS	Madison, Gallatin	Madison	N 1549	80,057
FS	Gallatin	Madison	E 1549	105,760
FS	Madison, Gallatin	Madison South	S 1549	77,559
FS	Madison, Gallatin	Madison	R 1549	32,640
FS	Gallatin, Park	Gallatin Divide	G 1548	81,582
FS	Gallatin, Park	Hyalite	H 1548	22,268
FS	Beaverhead	Mt. Jefferson	1962	4,600
FS	Fergus, Golden Valley	Big Snowies	A, B, S 1739	95,861
FS	Meagher, Judith Basin	Middle Fork Judith	1734	91,000
FS	Beaverhead	Italian Peak	I 1945	12,996
FS	Madison.	Madison	J 1549	29,826
	Total FS	Number of areas = 25		1,207,769

TABLE A2
PROXIMITY OF WILDERNESS TO POPULATION CENTERS

Statutory Wilderness within One Day's Travel Time of Identified Population Centers

Total Acres Within One Day's Travel Time of Population Centers	Population Centers Within One Day's Travel Time of Wilderness Areas	State	BLM		Other Agency	
			Number of Areas	Acreage	Number of Areas	Acreage
2,007,274	Billings, Montana	Montana	None	None	3	969,786
		Wyoming	None	None	2	1,037,483
4,122,934	Great Falls, Montana	Montana	None	None	11	3,033,917
		Idaho	None	None	1	1,089,017

Wilderness Areas Endorsed by the President within One Day's Travel Time of Identified Population Centers

1,449,062	Billings, Montana	Montana	None	None	19	260,152
		Wyoming	None	None	8	1,188,910
2,669,180	Great Falls, Montana	Montana	None	None	31	1,392,102
		Wyoming	None	None	1	1,013,221
		Idaho	None	None	1	163,857

Other Study Areas within One Day's Travel Time of Identified Population Centers

1,024,627	Billings, Montana	Montana	22	221,132	6	648,637
		Wyoming	12	154,858	None	None
1,236,580	Great Falls, Montana	Montana	24	222,514	11	1,014,066

APPENDIX B: GRAZING SYSTEMS

REST-ROTATION GRAZING

Under a rest-rotation grazing system, grazing is deferred on various parts of an allotment during succeeding years, and the deferred parts are allowed complete rest for one or more years (Society for Range Management 1974). The allotment is divided into pastures, usually with comparable grazing capacities. Each pasture is systematically grazed and rested so that livestock production and other resource values are provided for, while the vegetation cover is simultaneously maintained or improved. This practice provides greater protection of the soil resource against wind and water erosion (USDA, FS 1965; Hormay 1970; USDA, FS 1972; Ratliff and Reppert 1974).

Any of several rest-rotation grazing systems may be used, depending upon the objectives for the allotment and the number of pastures.

DEFERRED ROTATION GRAZING

Deferred rotation is the discontinuance of grazing on different parts of an allotment in succeeding years. This allows each pasture to rest successively during the growing season to permit seed production, establishment of seedlings, and restoration of plant vigor (Society for Range Management 1974). One or more pastures are grazed during the spring, while the remaining one or more pastures are rested until after seed ripening of key species, and then grazed. Deferred rotation grazing differs from rest-rotation grazing in that no yearlong rest is provided.

DEFERRED GRAZING

Deferred grazing is the discontinuance of grazing by livestock on an area for a specified period of time during the growing season. Under this system, grazing would begin after key plants have reached an advanced stage of development in their annual growth cycle. The growing season rest provided by this system promotes plant reproduction, establishment of new plants, or restoration of the vigor of old plants (American Society of Range Management 1964).

ALTERNATE GRAZING

Alternate grazing is grazing by livestock every other season, with the area being rested in the alternate year. Stoddard, Smith, and Box (1975) describe the system:

> Rotation grazing, or alternate grazing, involves subdividing the range into units and grazing one range unit, then another, in regular succession. The rotation system of grazing is based upon the assumption that animals in large numbers make more uniform use of the forage, and that a rest from grazing is beneficial to the plant, even though it must support a greater number of animals in the shorter time during which it is grazed. Certainly, proper rotation grazing results in more uniform utilization. Larger numbers of animals in small units are forced to spread over the entire area and to use the available forage more uniformly. Trampling is reduced because animals are held on small areas where feed is more abundant, and hence less travel is necessary.

SHORT-DURATION, HIGH-INTENSITY GRAZING

High-intensity grazing permits short-duration grazing with the stocking rate higher than what would be considered normal. The purpose of this type of system is to obtain uniform use of all plants, desirable and undesirable alike, and to prevent regrazing on regrowth of the most desirable plants. This system allows desirable plants to compete for nutrients on an equal basis with less desirable plants.

APPENDIX C:

METHODOLOGY USED TO DETERMINE TIMBER POTENTIAL

CALCULATION OF PRESENT NET WORTH

The basic unit of analysis for timber resources in each WSA is the Economic Analysis Unit (EAU). An EAU is defined as an area served by a road network with a single point of entry into the study area. BLM personnel developed the road networks on the basis of knowledge of the study areas. Each EAU (and road network) is independent of every other EAU in a study area. Road segments are mapped sequentially in segments from the single point of origin to the terminus points.

EAUs are in turn subdivided into stands which are attached to road segments. These stands are classified according to aerial photointerpretation (PI) type and probable harvest method (clearcut, shelterwood). The probable method of logging each stand was also determined, since tractor-logged areas generate higher stumpage values than cable-logged areas. Commercial forest stands already allocated to other uses through the planning system, were left in the timber base for tradeoff value purposes. For example, timber harvesting already is restricted in the East Fork of Blacktail Deer Creek WSA because of wildlife constraints.

An extensive forest inventory was based on tree height and crown density. Strata (subdivisions for sampling purposes) from the inventory were used to determine volume averages by timber type. Extensive inventory plots taken throughout the Dillon Sustained Yield Unit were evaluated as to strata versus actual measured volumes.

These volumes were equated to timber cover type, since intensive stand inventories are not available for the study areas (see Table C-1).

Harvest schedules for existing stands were developed by district personnel, who considered factors such as accessibility and risk of catastrophic loss.

The initial stumpage price for tractor-logged areas is $64.80 per thousand board feet (MBF). This is the weighted average high bid value received by the Beaverhead National Forest from 1976 through fiscal year 1981. Future harvest values were adjusted to reflect projected real dollar increases in lumber prices and production costs.

FS timber sale appraisal figures, methods, and road costs are normally used in BLM sales. Methodology used was similar to that described by the Forest Service in *Economic Analysis of Timber: Montana Wilderness Study Act Areas* (USDA, FS 1980a), subject to changes in management objectives and available local data.

Road construction cost estimates were developed by resource area personnel from FS road cost data. All cost estimates were based on a minimum standard road. The decade of construction for each road segment was estimated and used to discount road costs to the present. Reconstruction and maintenance costs also were calulated.

The calculation of present net worth for the timber resource is determined both by land expectation value, (that is, the "bare land" or "site" value) and by the value of the existing stand at harvest date. The regenerated stand yield data, management cost estimates, stumpage valuation equations, and cost and price projections were used to determine site specific land expectation values.

In sequence, the calculation of present net worth was as follows:

1. The value of existing timber stands at the scheduled dates of harvest and the land expectation value of associated sites were determined.

2. The existing stand and land expectation values were discounted to the present and then added together. This sum is the present value of the stand plus site.

3. The present value of the stand plus site was added for all stands attached to each road segment.

4. Road construction, reconstruction, and maintenance costs for each road segment were discounted to the present and subtracted from the total timber values. This produced a present net worth for the site and timber associated with each segment.

5. The present net worth associated with the road segments were added from the terminal points toward the origin. In this process, areas that cannot be accessed without incurring an economic loss were identified.

The result is that no road segment terminates in an area of negative present net worth. Also, road segments with a negative present net worth may be built if access is provided to sufficient positively valued timber beyond the negative segment. When complete, the only portion of an EAU that will be managed is the area that generates a positive present net worth.

The analysis was done using real discount rates of 4% and 7-3/8%. Most EAUs came out with negative values. This is not surprising however, since the reason that

these areas are still roadless is that they have always appeared difficult and expensive to develop.

Maps used for acreage and volume computations and computer printouts from the economic analysis are available at the district office in Butte.

TIMBER PRODUCTION CAPABILITY

The timber production potential of the eight WSAs was analyzed. BLM specialists discussed these areas with the local timber industry and estimated operability criteria, access, and commercial production possibilities. An analysis was made of past extensive inventory data for productivity figures and acreages by strata (strata were based on tree height and crown density). This analysis is summarized in Table C-2.

In evaluating timbered lands for their value for production of forest products, the first step is to decide which lands are physically capable of timber production without irreversible damage to the environment. Those areas exceeding 70% slope were automatically dropped from the productive base as too steep for the production of forest products. Areas between 40 and 70% slope were considered as potential cable skidding areas. Slopes of less than 40% were considered loggable by tracked vehicles or rubber-tired tractors. Table C-3 shows the forest base acreages of each WSA.

The remaining base acreages are further reduced by adverse location, damageable site, soil restrictions, regeneration problems, and economic considerations.

A decision had to be made on whether or not to include cable yarding acreages in the base. While cable yarding is not in use now in the areas under consideration, it has been used in the past and is considered technically and economically feasible. Subject to silvicultural and economic considerations, cable yarding areas are considered to be within the base acreage.

Silviculture requirements of forest stands often determine whether the stand is harvestable and to what extent the forest canopy can be disturbed or removed. The following general guidelines are used in determining productivity capability:

1. No south or west slopes will be clearcut.

2. Clearcuts will be considered only in lodgepole pine on north or east slopes. Most fir stands are in habitat types where heat and drought prevent regeneration, so clearcutting is not feasible.

3. A minimum of 3mbf/acre must be available to log before cable logging is economically feasible. Other aspects of the sale area may alter this figure slightly.

4. No precommercial thinning is being considered.

5. Stands will be managed for natural regeneration as opposed to planting.

6. Only stands capable of producing more than 20 cubic feet per acre per year will be considered commercial.

7. Forested scree, scattered isolated tracts of less than 5 acres, and areas nonrecoverable by ordinary logging methods will not be considered harvestable.

8. Stands on south and west slopes which are characterized by little or no soil development are excluded from harvestable acreage.

9. All noncommercial and nonoperable stands have been eliminated through the reductions made for slope and the application of assumptions six, seven, and eight.

10. Where practicable this economic analysis will follow the format of the wilderness study for Mount Henry, Taylor-Hilgard, and West Pioneer (USDA, FS 1980b.)

ASSUMPTIONS USED IN THE BLM ECONOMIC ANALYSIS

Timber Economics

1. All prices and costs are adjusted for inflation and are in first quarter 1980 dollars.

2. The initial stumpage price for tractor logged areas is $64.80/mbf. This is the weighted average high bid value received by the Beaverhead National Forest during the period 1976 through 1981.

3. In areas that will require cable logging, the initial stumpage price is reduced to $51/mbf. This is consistent with FS experiences on the Bitterroot, Lolo, and Flathead national forests.

4. All timber values are discounted from the midpoint of each decade (1985, 1995, etc.). Projections of the real increase in lumber prices and production costs have been developed by the FS for the Resource Planning Act. These projections are used to determine future stumpage values.

5. It is assumed that the cost of sale preparation and administration is $9/mbf (from USDA, FS 1980a).

6. It is assumed that the annual cost of timber management is $1.25/acre/year (from USDA, FS 1980a).

7. Site or land expectation values are similar to those calculated for the Beaverhead National Forest in the MWSA economic analysis.

Road Costs

1. All roads are built one year prior to initial harvest.

2. Roads are reconstructed every 40 years at 50% of initial cost.

TABLE C-1
FOREST COVER TYPES EQUATED TO EXTENSIVE INVENTORY STRATA

Extensive Inventory Stratification			Forest Cover Type		Average Standing Volume per Acre (Gross Scribner-Fixed Top-Board Feet)[1]
Strata	Percentage of Crown Closure	Diameter at Breast Height (inches)	Percentage of Crown Density	Size Class	
Seedlings and saplings	—	.1 - 4.9	—	1	3,400
Poorly-stocked poles	Less than 40	5 - 8.9	Less than 40	2	3,200
Medium-stocked poles	40-70	5 - 8.9	40-70	2	4,700
Well-stocked poles	70-100	5 - 8.9	70-100	2	7,700
Poorly-stocked sawlogs	Less than 40	9+	Less than 40	3-4	5,800
Medium-stocked sawlogs	40-70	9+	40-70	3-4	7,900
Well-stocked sawlogs	70-100	9+	70-100	3-4	9,000

[1]Taken from extensive inventory field plots.

TABLE C-2
TOTAL ACREAGES BY SIZE CLASS AND STOCKING PERCENTAGE[1]

Wilderness Study Area	Seedlings and Saplings Less Than 4.9" DBH[2] (Size Class 1)	Poles 5"-8.9" DBH (Size Class 2) Percentage of Crown Closure			Sawtimber 9" + DBH (Size Class 3) Percentage of Crown Closure			Total Acreage (Forested)
		0-40	40-70	70-100	0-40	40-70	70-100	
Ruby Mountains, MT-076-001	718	2,583	2,128	2,835	1,478	3,459	4,266	17,467
Blacktail Mtns., MT-076-002	1,399	700	962	2,186	262	1,224	2,361	9,094
East Fork of Blacktail Deer Creek, MT-076-007	155	155	387	619	464	155	619	2,554
Hidden Pasture, MT-076-022	—	262	175	437	87	—	87	1,048
Bell and Limekiln Canyons, MT-076-026	350	87	175	350	350	262	87	1,661
Henneberry Ridge, MT-076-028	87	—	175	525	—	87	—	874
Farlin Creek, MT-076-034	—	—	—	87	175	175	175	612
Axolotl Lakes, MT-076-069	—	—	273	826	389	1,338	1,174	4,000

[1]Before reductions in production capability
[2]Diameter at breast height

NOTE: Data obtained from extensive inventory photo interpretation sample points.

TABLE C-3
FOREST BASE ACREAGES

Wilderness Study Area	Total Forested Acreage	Percentage of Slope			Acres of More Than 70 Percent Slope Removed from Base	Commercial Forest Land Acres (Operable Base)	Tractor Logging		Cable Logging	
		Less Than 40	40-70	More Than 70			Acres	Percentage of Operable Base	Acres	Percentage of Operable Base
Ruby Mountains, MT-076-001	17,467	13	51	36	6,288	11,179	2,271	20	8,908	80
Blacktail Mtns., MT-076-002	9,094	38	40	22	2,001	7,093	3,456	49	3,637	51
East Fork of Blacktail Deer Creek, MT-076-007	2,554	6	58	36	919	1,635	153	9	1,482	91
Hidden Pasture, MT-076-022	1,049	17	50	33	346	703	178	25	525	75
Bell and Limekiln Canyons, MT-076-026	1,661	45	55	—	—	1,661	747	45	914	55
Henneberry Ridge, MT-076-028	874	67	—	33	288	586	586	100	—	—
Farlin Creek, MT-076-034	612	80	20	—	—	612	490	80	122	20
Axolotl Lakes, MT-076-069	4,000	24	38	38	1,520	2,480	960	39	1,520	61
Total	37,311				11,362	25,949	8,841		17,108	

NOTE: Data obtained from extensive inventory photo interpretation sample points.

3. All roads will require an annual maintenance cost of $81.94/mile.

Timber Harvesting

1. All lodgepole pine timber types will be clearcut with a rotation period of 80 years.

2. All other timber types will be shelterwood cut with a rotation period of 120 years.

3. Harvesting will begin in the decade of access. An equal acreage will be cut during each decade of the conversion period.

4. Stands that are in size class 2 will convert to size class 3 in 40 years. Stands that are size class 3 will be assumed to remain size class 3 during the entire conversion period. Density classes will be assumed to be constant during the entire conversion period.

5. On shelterwood cut areas, 60 percent of the volume is removed in the initial (regeneration) entry with the remaining volume cut 20 years later.

APPENDIX D: LEGAL DESCRIPTION OF LANDS IN THE WILDERNESS STUDY AREAS

TABLE D

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
Ruby Mountains MT-076-001	5S	5W	27	SW¼			160.00
			28	All			640.00
			29	E½, E½W½, SW¼NW¼, SW¼SW¼			600.00
			30	E½SE¼			80.00
			31	Lots 6 and 7, E½			400
			32	All			640.00
			33	All			640.00
			34	All			640.00
	6S	5W	2	Lot 4			51.20
			3	All			690.53
			4	All			680.32
			5	All			680.52
			6	All			716.57
			7	All			680.10
			8	All			640.00
			9	All			640.00
			10	All			645.40
			11	NW¼, S½			480.00
			12	All			640.00
			14	All			640.00
			15	All			643.16
			16			640.00	
			17	All			640.00
			18	All			683.20
			19	Lot 1, NE¼, E½NW¼, NE¼SW¼, SW¼			491.66
			20	All			640.00
			21	All			640.00
			22	All			641.60
			23	Lots 1, 2, 3, 4, 5, S½N½, N½S½, S½SW¼, SW¼SE¼, except for that portion of Lot 5 patented under the 1872 mining law	1.02		638.98
			24	Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, S½N½, E½SE¼, except those portions of Lots 5, 6, 7, 8, 9, and 10 patented under the 1872 mining law	34.82		605.18
			26	All			640.00
			27			640.00	
			28	All			640.00
			29	All			640.00

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
Ruby Mountains (cont.)			30	Lots 1, 2, 3, 4, NW¼NE¼			250.52
			31	Lots 1, 2, 3, 4, E½W½, S½SE¼			456.00
			32	All			640.00
			33	W½	320.00		320.00
			34	All			640.00
	6S	6W	11	NE¼SE¼			40.00
			12	Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, SE¼NE¼, NE¼SE¼			517.76
			13	Lots 1, 2, 3, S½NE¼, SE¼NW¼, E½SE¼			320.54
			22	SE¼SE¼			40.00
			23	S½NE¼, SE¼NW¼, S½SW¼, SE¼			360.00
			24	NW¼NW¼, S½NW¼, SW¼			280.00
			25	All			640.00
			26	E½NW¼, S½			400.00
			34	NE¼, NE¼SE¼, portions of Lot 7, NW¼SE¼, NE¼SW¼, SW¼NE¼			230.00
			35	Lots 1, 2, NE¼, E½NW¼			320.67
	7S	5W	4	All			632.12
			5	All			632.16
			6	All			692.12
			7	Lots 1, 2, 3, 4, 5, 6, NE¼			350.90
			8	All			320.00
Total					995.84	640.00	26,611.21
Blacktail Mountains MT-076-002	9S	8W	17	Lots 2, 3, 4, 5, 6, SW¼SW¼			242.84
			18	Lots 7, 8, NE¼SW¼			121.03
			19	All			576.48
			20	All			641.22
			21	Lots 1, 2, 3, 4, 5, 6, N½NW¼, SE¼NW¼, N½SE¼, SE¼SE¼			485.10
			22	SW¼SW¼			40.00
			27	Lots 1, 2, 3,, 4, 5, 6, N½NW¼, SE¼NW¼, NW¼SE¼, SE¼SE¼			429.96
			28	All			642.70
			29	All			640.00
			30	Lots 1, 2, 3, a portion of Lot 4, E½W½, E½			595.00
			33	All			640.00
			34	All			610.20
			35	Lots 1, 2, 3, 4, 5, 6, NW¼NW¼			270.24

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
Blacktail Mountains (cont.)	10S	8W	2	All			648.88
			3	All			648.16
			4	All			649.28
			5	NE¼, that portion of the NW¼NW¼ located south and east of the Sheep Creek Road, S½NW¼, S½			585.00
			6	that portion of the SE¼NE¼, NE¼NE¼, SW¼NE¼, W½SE¼ located south and east of the Sheep Creek Road, E½SE¼			162.00
			7	NE¼NE¼, that portion of the W½NE¼, SE¼NE¼ located north and east of the Sheep Creek Road			138.00
			8	N½, E½SW¼, SE¼			560.00
			9	All			640.00
			10	W½			320.00
			11	E½			320.00
			12	All			640.00
			13	All			640.00
			14	NE¼, N½NW¼, SW¼NW¼, NW¼SW¼, N½SE¼			400.00
			24	NE¼			160.00
	10S	7W	6	Lots 9, 10, 11, E½SW¼, W½SE¼, SE¼SE¼			298.65
			7	Lots 1, 3, 4, NE¼, NE¼NW¼, N½SE¼			378.67
			8	Lots 1, 2, 3, 4, N½NW¼, SE¼NW¼			284.45
			17	Lots 6, 7, S½NW¼, SW¼, W½SE¼			411.75
			18	Lots 1, 2, 3, 4, S½NE¼, E½W½, SE¼			541.52
			19	Lots 1, 2, NE¼, E½NW¼			311.33
			20	N½, SE¼			480.00
			21	All			655.87
			22	Lots 1, 2			80.75
			27	All			653.16
			28	N½, N½SW¼, SE¼SW¼, that portion of the SW¼SW¼ north and east of the jeep trail, SE¼			636.00
	9S	9W	13	SE¼SE¼, that portion of the SW¼SE¼ located south and east of the Sheep Creek Road			51.00
			24	E½E½, that portion of the W½NE¼ and NW¼SE¼ located east of the Sheep Creek Road			250.00
Total							17,479.24

TABLE D, page 4

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
East Fork of Blacktail Deer Creek, MT-076-007	11S	5W	13	S½N½, S½			480.00
			22	Lot 4, SE¼SW¼, S½SE¼, NE¼SE¼			205.57
			23	All			640.00
			24	All			640.00
			25	All			640.00
			26	All			640.00
			27	N½, SE¼, all of the SW¼ except the existing road paralleling the East Fork of Blacktail Deer Creek			635.00
			28	That portion of Lot 2 south of the existing road which parallels the East Fork of Blacktail Deer Creek			194.30
			32	S½SW¼, SE¼			240.00
			33	All			640.00
			34	N½ except for the existing road which parallels the East Fork of Blacktail Deer Creek, S½			636.00
			35	All			640.00
Total							6,230.87
Hidden Pasture MT-076-022	12S	10W	29	All			640.00
			30	All			653.80
			31	E½, E½W½, that portion of Lots 1, 2, 3, and 4 east of the Muddy Creek Road			626.33
			32	All			640.00
	13S	10W	5	All			640.00
			6	Lots 1, 2, 3, that portion of Lots 4 and 5 located east of the Muddy Creek Road, S½SE¼, SE¼NW¼, that portion of the E½SW¼ located east of the Muddy Creek Road, SE¼			543.00
			7	NE¼, that portion of the NE¼NW¼ located east of the Muddy Creek Road, N½SE¼			269.00
			8	All			640.00
			9	All			640.00
			15	All			640.00
			16			640.00	
			17	N½, N½SW¼, that portion of the SW¼SW¼ located east of Muddy Creek Road, SE¼SW¼, SE¼			639.00

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
Hidden Pasture (cont.)			18	that portion of SE¼NE¼ located east of Muddy Creek Road			39.00
			20	E½, E½NW¼, that portion of W½NW¼, N½SW¼, SE¼SW¼ located east of Muddy Creek Road, SE¼			512.00
			21	All			640.00
			22	All			640.00
			25	N½SW¼, N½SE¼, SW¼SE¼, that portion of SE¼SE¼ located north and west of Big Sheep Creek Road			625.00
			26	All			640.00
			27	All			640.00
			28	All			640.00
			29	E½NE¼, that portion of W½NE¼, SW¼SE¼ located east of Muddy Creek Road, N½SE¼, that portion of SE¼SE¼ located north and west of Big Sheep Creek Road			304.00
			32	that portion of the N½NE¼ located north and east of Muddy Creek Road			18.00
			33	NE¼, that portion of the NW¼, W½SE¼ located north and east of Muddy Creek Road, E½SE¼			409.00
			34	All			640.00
			35	N½SW¼, W½SE¼, that portion of E½SE¼ located north and west of Big Sheep Creek Road			603.00
			36	W½NW¼, that portion of NE¼NE¼, W½NE¼, E½NW¼, and N½SW¼ located north of Big Sheep Creek Road			197.00
	14S	10W	2	NW¼, that portion of the NE¼SW¼ and W½SE¼ located west of Big Sheep Creek Road			388.00
			3	NE¼, N½NW¼, N½SE¼, SE¼SE¼, SE¼NW¼, that portion of SW¼NW¼, N½SW¼, SW¼SE¼ located north and east of Muddy Creek Road			542.00
			11	that portion of NW¼NW¼ located north of Big Sheep Creek Road			7.00

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
Hidden Pasture (cont.)	13S	9W	7	Lots 2, 3, 4, SE¼NW¼, E½SW¼, SW¼SE¼			268.00
			18	Lots 1, 2, 3, 4, NE¼, E½W½, N½SE¼			543.04
			19	Lots 1, 2, 3, 4, E½W½			301.44
			30	Lots 1, 2, NW¼NE¼, NW¼, that portion of E½NE¼, SW¼NE¼, Lot 3, and NE¼SW¼			342.00
Total						640.00	15,509.61
Bell and Limekiln Canyons, MT-076-026	10S	11W	34	that portion of the SE¼ east and south of a road which provides access up to and south of the radio tower			59.45
			35	S½NE¼, SE¼NW¼, that portion of SW¼NW¼ which is south and east of the road providing access to the radio tower, S½			464.65
	11S	11W	1	All			633.04
			2	All			647.88
			3	E½, that portion of E½NW¼ east of a jeep trail in that area, that portion of SW¼ south and east of a jeep trail in that area			478.05
			10	NE¼, NE¼NW¼, N½SE¼, SE¼SE¼, that portion of SW¼SE¼ south of a jeep trail in that area			324.35
			11	N½, SW¼, S½SE¼			560.00
			12	N½N½, that portion of S½NE¼ north of a jeep trail in that area			231.05
			13	W½, S½SE¼			400.00
			14	N½, N½SW¼, SE¼	80.00		560.00
			15	All			640.00
			17	S½NE¼, that portion of NW¼NW¼ south of the jeep trail, S½NW¼, S½			519.15
			18	that portion of N½NE¼ south of Kissick Canyon Road, S½NE¼, N½SE¼, that portion of S½SE¼ north of the Johnson Canyon/Deer Canyon Road			280.35
			20	NE¼, that portion of NW¼SW¼, SE¼, north and east of the Johnson Canyon/Deer Canyon Road, E½SE¼, that portion of W½SE¼ north and east of the Johnson Canyon/Deer Canyon Road			373.40
			21	All			640.00
			22	N½, SW¼			480.00

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
Bell and Limekiln Canyons (cont.)			23	NE¼, S½NW¼, S½	80.00		560.00
			24	All			640.00
			26	N½NE¼, SE¼NE¼			120.00
			28	N½, N½S½, that portion of S½S½ north of the Deer Canyon Road			553.95
			29	NE¼NE¼, that portion of NW¼NE¼, SE¼NE¼, NE¼SE¼ east of the Johnson Canyon/Deer Canyon Road, that portion of SE¼SE¼ north of the Deer Canyon Road and East of the Johnson Canyon/Deer Canyon Road			105.25
Total					160.00		9,650.57
MT-076-028	8S	11W	7	Lot 13, a portion of Lots 7, 8, and 10, a portion of W½SE¼			129.00
			8	Lots 11, 12, 13, and 14			65.54
			17	Lots 2, 3, and 4, S½N½, S½			623.00
			18	E½, a portion of E½W½			355.00
			19	E½, a portion of E½W½			463.00
			20	All			640.00
			21	NW¼NE¼, S½NE¼, NW¼, S½, that portion of NE¼NE¼ located south and west of the Grasshopper Creek Road			633.00
			22	Those portions of Lots 3, 4, 5, 6, and 8 located south of the Grasshopper Creek Road, SW¼NW¼, SW¼, W½SE¼, SE¼SE¼			477.00
			23	Those portions of Lots 6, 7, 8, 9 and 10 located south of the Grasshopper Creek Road			159.00
			24	Those portions of Lots 6, 8, and 10 south of the Grasshopper Creek Road			39.00
			25	Lots 7 and 8, those portions of Lots 3, 4, 5, and 6 south of the Grasshopper Creek Road, W½NW¼, SE¼NW¼, SW¼NE¼, W½SE¼, SW¼			600.00
			26	All			640.00
			27	All			640.00
			28	E½, E½W½			480.00
			30	NE¼, a portion of E½W½ and SE¼			360.00
			33	E½, E½W½			480.00
			34	All			640.00
			35	All			640.00

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
Henneberry Ridge (cont.)	8S	10W	30	Lot 9, that portion of Lots 2, 8, and 10 south of the Grasshopper Creek Road and west of transmission line right-of-way M-5487			165.00
			31	That portion of Lots 1, 2, and 3 west of transmission line right-of-way M-5487			53.00
	9S	11W	1	Lots 2, 3, and 4, S½NW¼, SW¼, that portion of Lot 1, S½NE¼, and W½SE¼ west of transmission line right-of-way M-5487			413.00
			2	All			576.36
			3	Lots 1, 2, 3, 4, S½N½			257.96
			11	That portion of the N½ north of road right-of-way M-19227			163.00
			12	NW¼NW¼, that portion of NW¼NE¼, NE¼NW¼, S½NW¼, and N½SW¼ west of transmission line right-of-way M-5487 and north of road right-of-way M-19227			115.00
Total							9,806.86
Farlin Creek MT-076-034	5S	12W	33	S½SE¼			80.00
			34	SW¼			160.00
	6S	12W	4	Lots 1, 2, 3, 4, S½N½, S½			518.12
			5	SE¼NE¼, NE¼SE¼, S½SE¼			160.00
			8	NE¼ and that portion of the E½NW¼ east and south of Mineral Survey 10296 (Patent No. 876062)			220.90
Total							1,139.02
Axolotl Lakes MT-076-069	7S	2W	7	SE¼SE¼			40.00
			8	S½NW¼, that portion of N½NW¼ south of the county road, SW¼			272.00
			17	S½NE¼, NW¼, S½			560.00
			18	All			601.00
			19	All			602.92
			20	All			640.00
			28	N½NW¼			80.00
			29	All			640.00
			30	All			603.52
			31	All			602.84
			32	All			640.00

Wilderness Study Area	Township	Range	Section	Description	Acres		
					Private Inholdings	State Inholdings	Public Land
Axolotl Lakes (cont.)	7S	3W	13	Lots 1, 2, 3, 4, 5, 6, and 7, E½		23.00	502.07
			14	Lot 12			3.44
			23	Lots 1, 9, 14, 15, 16, and 17			120.42
			24	Lots 1, 2, and 3, E½, E½NW¼, SW¼		1.00	624.77
			25	All			640.00
			26	Lots 1, and 2, E½, E½NW¼, SW¼NW¼, SW¼			631.18
Total					24.00		7,804.16

APPENDIX E: ECOSYSTEM REPRESENTATIONS BY ACREAGE

TABLE E
TOTAL ACRES BY ECOSYSTEM

Wilderness Study Area	Douglas-fir Forest	Sagebrush Steppe	Foothills Prairie	Alpine Meadows/ Barren
Ruby Mountains, MT-076-001	18,900	4,500	2,300	600
Blacktail Mountains, MT-076-002	9,600	2,600	4,100	1,200
East Fork of Blacktail Deer Creek, MT-076-007	2,000	1,100	1,400	1,700
Hidden Pasture, MT-076-022	1,400	11,500	2,600	—
Bell and Limekiln Canyons, MT-076-026	2,600	3,000	4,100	—
Henneberry Ridge, MT-076-028	900	8,700	200	—
Farlin Creek, MT-076-034	600	500	—	—
Axolotl Lakes, MT-076-069	4,800	300	2,400	300

Followng is a brief description of each of the ecosystems represented in areas discussed in this study.

DOUGLAS-FIR FOREST (*Pseudotsuga*) Type #11

Physiognomy: Medium dense forest of medium tall needleleaf evergreen trees

Dominants: Douglas-fir (*Pseudotsuga menziesii*)

Other Components: *Abies concolor, Larix occidentalis, Physocarpus malvaceous, Picea pungens, P. glauca*(northern part), *Pinus contorta, P. ponderosa* (lower elevations), *Populus tremuloides*

Occurrence: Northern Rocky Mountains and Washington

ALPINE MEADOWS AND BARREN (*Agrostis, Carex, Festuca, Poa*) Type #45

Physiognomy: Usually short grasses and sedges, dense to very open with extensive barren areas; many forbs

Dominants: Bentgrass (*Agrostis* spp.); Sedges (*Carex* spp.); Hairgrass (*Deschampsia caespitosa*); Fescue (*Festuca viridula*); Woodrush (*Luzula spicata*); Mountain timothy (*Phleum alpinum*); Bluegrass (*Poa* spp.); Spike trisetum (*Trisetum spicatum*)

Other Components: *Achilla* spp., *Antennaria* spp., *Aquilegia* spp., *Arenaria* spp., *Castilleja* spp., *Draba* spp., *Erigeron compositus, lichen* spp., *Oxyria digyna, Pentstemon fruticosus, Phacelia* spp., *Phlox caespitosa, Polemonium* spp., *Polygonum* spp., *Potentilla diversifolia, Potentilla* spp., *Salix nivalis, Salix* spp., *Saxifraga* spp., *Selaginella* spp., *Sibbaldia procumbens, Sieversia turbinata, Solidago* spp.

Occurrence: Rocky Mountains, Cascade Range, Sierra Nevada

SAGEBRUSH STEPPE (*Artemisia-Agropyron*) Type #49

Physiognomy: Dense to open grassland with dense to open shrub synusia

Dominants: Bluebunch wheatgrass (*Agropyron spicatum*); Big sagebrush (*Artemisia tridentata*)

Other Components: *Artemisia arbuscula* (western part), *A. nova* (eastern part), *Balsamorrhiza sagittata, Festuca idahoensis, Lithospermum ruderale, Lupinus sericeus, Oryzopsis hymenoides, Phlox* spp., *Poa nevadensis, P. secunda, Purshia tridentata, Sitanion* spp.

Occurrence: Pacific Northwest and eastward to Rocky Mountains

FOOTHILLS PRAIRIE (*Agropyron-Festuca-Stipa*) Type #56

Physiognomy: Open to fairly dense grassland of usually rather short grasses

Dominants: Bluebunch wheatgrass (*Agropyron spicatum*); Idaho fescue (*Festuca idahoensis*); Rough fescue (*Festuca scabrella*); Needle-and-thread grass (*Stipa comata*)

Other Components: *Achillea millefolium, Agropyron smithii, Artemisia frigida, Bouteloua gracillis, Carex filifolia, Eriogonum* spp., *Koeleria cristata, Pentstemon* spp., *Poa secunda*

Occurrence: Western Montana

SOURCES: Kuchler, A.W., *Potential Natural Vegetation of the Conterminous United States*, Special Publication No. 36 (n.p.: American Geographical Society, 1964); U.S., Department of Agriculture, Forest Service, *Ecoregions of the United States*, by Robert G Bailey (map) (Ogden, UT, 1976).

APPENDIX F:
SOILS AND WATER CHARACTERISTICS OF WILDERNESS STUDY AREAS

SOILS

Physical properties of a soil can largely determine soil capabilities and limitations. Physical characteristics, singly or collectively, can influence other characteristics. For example, size and arrangement of soil particles (soil texture and structure) influence permeability, available water capacity, surface runoff, compaction hazard, erosion susceptibility, and productivity.

The susceptibility of a soil to erosion should be a determinant in multiple use management. Most of the soil associations in the WSAs have moderate to severe erosion susceptibility; and where adequate management precautions to protect watershed integrity have been lacking, accelerated erosion has resulted.

Erosion condition is an expression of current erosion based on field observations. The Soil Surface Factor Method was used to determine erosion condition. Erosion condition classes are primary factors in determining watershed condition.

Water is the primary erosion agent in the Dillon Resource area; however, there are specific locations with considerable wind erosion. Short duration, high intensity convective thunderstorms common to the area are the most damaging in terms of erosion, and spring runoff is the next most severe influence.

Compaction is the packing together of soil particles by some force at the surface, which results in an increase in soil density and a decrease in pore space. When pore space is decreased to a point where soil, water, air, and plant roots have restricted movement, stunted plant growth often results.

Moist clays are easily compacted; however, contrary to widespread belief, they are not a necessary major component of soils that are subject to compaction. Studies show that medium texture soils are easier to compact to higher bulk densities than fine or coarse textured soils. A review of the literature indicates that optimum moisture for compaction is about midway between field capacity and the permanent wilting point. Trampling causes the greatest amount of compaction under moist soil conditions, which occur during spring. This damage is intensified through vegetation removal by livestock. Water infiltration is reduced in compacted soil, so less water is available for plant growth. Permeability is also slower and surface runoff is increased, and this increases erosion.

Soil compaction is especially noted along drainages and near additional water sources, where livestock tend to congregate. However, significant compaction also has been found on the open range away from water. This is an indication of early spring livestock turnout, when soils are too moist.

Table F-1 shows the major characteristics of the soils associations found in the eight WSAs. Some of the terms which are used to describe these soils are listed below.

AVAILABLE WATER CAPACITY. The portion of water in a soil that can be readily absorbed by plant roots. It is rated on the basis of soil characteristics that influence the ability of the soil to hold water, such as content of organic matter, soil texture, and soil structure. Soils in an arid climate necessarily have low available water capacity because so little water is added to the soil as precipitation.

COMPACTION. The process of packing firmly and closely together; the state of being so packed; e.g., mechanical compaction by livestock or vehicular activity. Soil compaction results from particles being pressed together, so that the volume of the soil is reduced. It is influenced by the soils' physical properties, moisture content, and the type and amount of compactive effort.

EFFECTIVE ROOTING DEPTH. The distance from the mineral surface to any layer in the soil that is highly restrictive to air, water, and root movement. The failure of roots to penetrate some soil horizons may also be due to deficiencies of moisture, nutrients, or oxygen or to unfavorable physical conditions. Effective rooting depth is recognized where roots change in abundance from common to few in the soil profile over a distance of 5 to 8 cm (2 to 3 inches).

EROSION SUSCEPTIBILITY. The susceptibility of a soil to erosion when no cover is present. The rate of soil displacement depends on the physical properties of the soil, rainfall intensity, and slope gradient.

HYDROLOGIC SOIL GROUP. A class of soils that have similar general infiltration and water movement ability through the soil profile and bedrock. Hydrologic groups are used to estimate runoff after rainfall. Soil properties that influence infiltration rates and runoff are depth to a water table, water intake rate and permeability, and depth to layers of slowly permeable soil.

Group A. Soils that have high infiltration rates when thoroughly wetted. This group consists chiefly of deep, well-drained to excessively drained sand and/or gravel. Group A soils have a high rate of water transmission and would result in a low runoff potential.

Group B. Soils that have moderate infiltration rates when thoroughly wetted. This group consists of moderately deep to deep, moderately well-drained to well-drained soils with moderately fine to moderately coarse textures. Group B soils have a moderate rate of water transmission.

TABLE F-1
SOILS CHARACTERISTICS OF WILDERNESS STUDY AREAS

Soil Association	Occurrence in WSAs	Slope	Soil Depth	Effective Rooting Depth (inches)	Surface Texture	Available Water Capacity	Permeability	Drainage	Compaction Hazard	Surface Runoff	Erosion Susceptibility	Range Sites	Hydrologic Group	Potential Productivity (Forage Pounds per Acre)
2	022, 026, 028, 034	Nearly level—very steep	Shallow—moderately deep	8-24	Loam—very cobbly loam	Low	Moderate—rapid	Excessively drained—well-drained	Low—moderate	Medium—very rapid	Moderate—severe	Shallow, stony	B	550-850
3	002, 007 026	Nearly level—very steep	Deep—moderately deep	15-23	Loam—gravelly loam	Low—high	Slow—moderately rapid	Well-drained	Low—severe	Slow—very rapid	Moderate—severe	Silty—where not timbered	B	600-850
4	022, 028	Nearly level—very steep	Moderately deep	8-21	Loam—gravelly loam	Low	Moderately slow—moderately rapid	Excessively drained—well-drained	Low—moderate	Slow—rapid	Low—moderate	Stony, silty	B	500-650
14	002	Sloping—very steep	Moderately deep—shallow	8-13	Loam—very cobbly loam	Low	Moderate—moderately rapid	Excessively drained—well-drained	Low—moderate	Medium—very rapid	Moderate—severe	Shallow	B	100-200
15	002	Sloping—very steep	Moderately deep	8-17	Loam—very cobbly loam	Low	Moderate—moderately rapid	Excessively drained—well-drained	Low—moderate	Slow—very rapid	Moderate—severe	Thin, hilly	B	75-100
20	001	Moderately sloping—steep	Shallow—deep	19-40	Loam—gravelly loam	Low—moderate	Moderate—moderately rapid	Well-drained	Very low—moderate	Medium	Moderate	Shallow, silty	B	1,600-2,600
21	001	Strongly sloping—very steep	Deep	24-30	Gravelly loam—channery loam	Low—very low	Moderate	Well-drained	Low	Slow—rapid	Moderate—severe	Silty where not timbered	B	360-720
22	069	Strongly sloping—very steep	Deep	60	Gravelly loam—channery loam	Moderate	Moderate—moderately rapid	Moderately well-drained-well-drained	Low—moderate	Medium	Moderate	Timbered	B	N/A

Group C. Soils that have slow infiltration rates when thoroughly wetted. This group consists of (1) soils with a layer that impedes the downward movement of water or (2) soils with moderately fine to fine texture and a slow infiltration rate. Group C soils have a slow rate of water transmission.

Group D. Soils that have very slow infiltration rates when thoroughly wetted. This group consists chiefly of (1) clay soils with high swelling potential, (2) soils with a high permanent water table, (3) soils with claypan or clay layer at or near the surface, and (4) shallow soils over nearly impervious materials. Group D soils have a very slow rate of water transmission.

RANGE SITE. A range site is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce characteristic kinds and amounts of vegetation.

SOIL ASSOCIATION. A mapping unit used on general soil maps, in which two or more defined taxonomic units occurring together in a characteristic pattern are combined because the scale of the map or the purpose for which it is being made does not require delineation of the individual soils.

SOIL SURFACE FACTOR. Numerical expression of surface erosion activity caused by wind and water as reflected by soil movement, surface litter, erosion pavement, pedestalling, rills, flow patterns, and gullies. Values vary from 0 for stable erosion condition to 100 for a severe condition.

WATER

Table F-2 lists the surface water characteristics of the eight WSA's.

TABLE F-2
SURFACE WATER CHARACTERISTICS OF WILDERNESS STUDY AREAS

WSA	Miles of Perennial Stream	Spring Occurrence	Lakes
Ruby Mountains (MT-076-001)	8	Numerous	—
Blacktail Mountains (MT-076-002)	7	Numerous	—
East Fork (MT-076-007)	5	Numerous	—
Hidden Pasture Creek (MT-076-022)	0	Few	—
Bell-Limekiln Canyons (MT-076-026)	0	Few	—
Henneberry Ridge (MT-076-028)	0	Few	—
Farlin Creek (MT-076-034)	2	Few	—
Axolotl Lakes (MT-076-069)	7	Numerous	7 lakes totaling less than 25 acres surface area

APPENDIX G: CULTURAL RESOURCES

Man has utilized southwest Montana for the past 12,000 years. During the prehistoric period the subsistence pattern involved transhumance between areas with an abundance of resources. Movements of populations involved both long distance travel and elevation changes. A wide diversity of animals, birds, fish, roots, berries, seeds, greens, and other vegetative products were used for food, clothing, shelter, ornaments and tools. Various lithic types, bone, and antler were prepared and used for tools. Over most of the year the basic group consisted of between 15 and 30 people but during seasons of surplus larger human groups were able to form. Table G lists the cultural resource site types known to exist in each WSA. There are other site types which are believed to exist in the WSAs, such as prehistoric graves, rock shelters, game traps, and drive alignments, which have not yet been recorded.

Occupation sites consist of living areas. Skin, brush, or wooden lodge structures were typically used and occasionally rock shelters were occupied. Typically all traces of shelters have disappeared and all that remains are a scatter of stone tools, fire hearths, and other debris. Such sites are known as lithic scatter sites. Occasionally the stones used to secure the base of skin or brush structures remain in place and these sites are known as stone circle or tipi ring sites. Standing conical log or brush structures are known as wickiups and are rare, because they are vulnerable to decay and fire activity. Rock shelters are also rare since they are entirely dependent on geological structures.

Subsistence sites directly relate to activities designed to gather resources. There appears to be a marked tendency in the archeological record toward the hunting of large groups of animals by prehistoric peoples. A de-

TABLE G
KNOWN CULTURAL RESOURCE SITE TYPES

Wilderness Study Area	Prehistoric			Historic			Inventory Status	Cultural Resource Value
	Occupation	Subsistence	Ceremonial	Occupation	Subsistence	Ceremonial		
Ruby Mountains MT-076-001	Lithic scatter Stone rings Wickiup	Hunting blind	Vision quest Eagle trap	Open camp	Trails, cairns, corral, mining, logging	Unknown	Project-related Management framework plan	High
Blacktail Mountains MT-076-002	Lithic scatter Wickiup	Lithic procurement, quarry, workshop, chipping station	Vision quest Rock art	Wooden cabin Stone cabin Open camp	Trails, cairns, corral, mining, water improvements, logging	Unknown	Project-related Management framework plan	Moderate
East Fork of Blacktail Deer Creek, MT-076-007	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No inventory	Unknown
Hidden Pasture Creek, MT-076-022	Lithic scatter Stone rings	Mass game kill, hunting blind, lithic procurement, quarry, workshop, chipping station	Rock art	Wooden cabin Stone cabin Open camp	Trails, cairns, corral, mining	Unknown	Project-related Management framework plan	High
Bell and Limekiln Canyons, MT-076-026	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No inventory	Unknown
Henneberry Ridge MT-076-028	Lithic scatter	Butchering station	Unknown	Wooden cabin	Trails, mining, logging	Unknown	No inventory	Unknown
Farlin Creek MT-076-034	Unknown	Unknown	Unknown	Wooden cabin	Trails, cairns, corral, mining, water improvements, logging	Unknown	No inventory	Low
Axolotl Lakes MT-076-069	Lithic scatter	Mass game kill, chipping station	Vision quest	Wooden cabin Stone cabin Open camp	Trails, cairns, corral, mining, mill, water improvements, logging	Grave	Project-related Management framework plan	High

posit of bone and butchering tools where no structural remains are present is known as a mass game kill site. Stone structures built into hillsides or scree near game trails are known as hunting blinds and may relate to cooperative or individual hunting. Individual hunting sites leave minimal archeological remains and are often overlooked as sites. All that may remain may be a projectile point, cutting tools, or heavy butchering tools and this site type is known as a butchering station.

Sites which relate to the acquisition of raw material for stone tool manufacture and the actual manufacturing of tools can take several forms. Lithic procurement sites relate to the direct gathering of raw materials and perhaps some preparatory working. When high quality materials are buried and excavations are present this type of site is termed a quarry. A workshop site is where the raw material is converted into tools. This site resembles a lithic scatter and may only be differentiated by a greater amount of lithic waste debris and the absence of such occupation debris as worn and broken tools. The chipping station site type is marked by a small collection of flakes and can represent casual tool sharpening or manufacture secondary to some other activity.

Ceremonial sites in this category include vision quest sites, cairns, engraved or painted rock art, graves, or pits or low rock structures used to trap raptors for their feathers.

Historic sites in southwest Montana relate to mining, agricultural, timber, and transportation activities. Intensive mining in the area began in 1862 and has continued to the present day. Early placer mining required water improvements, timber for housing, firewood, and sluice systems, and trails and roads for access.

With the exhaustion of the surface placers hard rock mining began. Milling sites were built and the use of steam machinery became more widespread. These activities intensified the need for water systems, auxiliary trails for transportation, cord wood, and wood for mine timbers.

Agricultural activities generally followed the mining activities. Within the Wilderness Study Areas, this activity involved first seasonal sheepherding and later cattle and horse grazing. A wide variety of historic site types accompanies this activity. Perhaps the most spectacular are "sheepherder monuments," large rock cairns built both as trail markers and for recreational art by the early sheepherders.

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GLOSSARY

(Including Acronyms and Abbreviations)

AMP. Allotment Management Plan. A concisely written program of livestock grazing management, including supportive measures, if required, designed to attain specific management goals in a grazing allotment.

AUM. Animal Unit Month. A standardized unit of measurement of the amount of forage necessary for the complete subsistence of one animal unit (one cow or one horse or five sheep, all over six months old) for one month; also, a unit of measurement of grazing privilege which represents the privilege of grazing one animal for a period of one month.

ACEC. Area of Critical Environmental Concern. An area within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards.

BAILEY-KUCHLER SYSTEM. A land classification system which divides the United States into various ecosystems based upon an integration of the natural factors of climate, vegetation, soils, and landform.

CEQ. Council on Environmental Quality.

COUNTRY ROCK. A general term applied to the rock surrounding and penetrated by mineral veins; in a wider sense applied to the rocks invaded by and surrounding an igneous intrusion.

CRIB. Computerized Resource Information Base. A computerized minerals resource file, consisting of geographic location, commodity, deposit and geologic information on all nonfuels minerals, metallic and nonmetallic.

CRITICAL MINERALS OR MATERIALS. Those materials vital to the national defense, the main source of which is within the continental limits of the United States, which may not be produced in quality and quantity sufficient to meet requirements.

CUSTODIAL ALLOTMENT. A minimally supervised grazing allotment on which the BLM generally specifies only the number and kind of livestock and the grazing season.

DREDGE, DREDGING. A method of obtaining resources or for deepening streams, swamps, or coastal waters by scraping and removing solids from the bottom.

EAU. Economic Analysis Unit. An area served by a road network with a single entry point (See Appendix C).

FIRE ASSAY. The assaying of metallic ores, usually gold and silver, by methods requiring a furnace heat.

FLPMA. Federal Land Policy and Management Act of 1976.

HARDROCK MINING. A term which refers to underground or open pit mining as opposed to placer or hydraulic mining.

HYDRAULIC MINING. A method of mining in which a bank of gold-bearing earth or gravel is washed away by a powerful jet of water and carried into sluices, where the gold separates from the earth by its specific gravity.

INGROWTH. The amount of wood fiber added to an existing stand of timber through natural growth.

INHOLDING. A parcel of nonpublic land surrounded by public land.

INTEREST RATE (DISCOUNT RATE). The value used to calculate the present value of a stream of benefits or costs extending into the future. The rate which is chosen tends to determine the rate of development of a resource over time. The lower the rate used, the more likely immediate development is to occur. At higher interest rates, development is more likely to be put off into the future, all other things being equal.

LEASABLE MINERALS. Those minerals or materials subject to lease by the federal government. Includes oil and gas, coal, phosphate, sodium, potash, and oil shale.

LOCATABLE MINERALS. Minerals or materials subject to disposal and development through the Mining Law of 1872 (as amended). Generally includes metallic minerals such as gold and silver and other materials not subject to lease or sale (some bentonites, limestone, talc, some zeolites, etc.).

LODE. A mineral deposit consisting of a zone of veins; a mineral deposit in consolidated rock as opposed to placer deposits.

LODE CLAIM. A mining claim including a lode, fissure, or fissure vein. In the United States the maximum length along the lode or vein is 457.5 meters and the maximum width is 183 meters.

MFP. Management Framework Plan. A planning decision document that establishes, for a given planning area, land use allocations, coordination guidelines for multiple use, and management objectives to be achieved for each class of land use or protection. It is the BLM's land use plan. An MFP is prepared in three steps: (1) resource recommendations, (2) impact analysis and alternative development, and (3) decision making. BLM plans developed after 1981 under an altered planning system will be called RMPs (Resource Management Plans).

MBF. Thousand board feet; a measure of timber volume.

MDF&G. Montana Department of Fish and Game.

MDFWP. Montana Department of Fish, Wildlife and Parks.

MMBF. Million Board Feet.

NONPOINT SOURCE. Pollutants which originate from diffuse runoff, seepage, drainage, or infiltration are said to have a nonpoint source.

NWPS. National Wilderness Preservation System.

ORV. Off-road vehicle.

PATENTED CLAIM. A claim on which title has passed from the federal government to the mining claimant under the 1872 mining law.

PLACER MINING. A form of mining in which the surface material is washed for gold or other valuable minerals. When water under pressure is employed to break down the gravel, the term hydraulic mining is generally used.

PLANNING CRITERIA. The factors used to guide development of the resource management plan, or revision, to ensure that it is tailored to the issue previously identified and to ensure that unnecessary data collection and analysis are avoided. Planning criteria are developed to guide the collection and use of inventory data and information, the analysis of the management situation, the design and formulation of alterna tives, the estimation of the effects of alternatives, the evaluation of alternatives, and the selection of the preferred alternative.

PNW. Present net worth.

RECREATION VISIT. One person engaged in one recreational activity for all or any part of a day.

ROTATION PERIOD. The period in years it takes to convert a natural old growth forest from its existing state to one of healthy young growing trees.

SALABLE MINERALS. "Common Variety" materials (sand and gravel, pumice, etc.) which are disposed of by sale by the federal government.

SCORP. (Montana) Statewide Comprehensive Outdoor Recreation Plan.

SECURITY COVER (Hiding Cover). The vegetation and topographic complex capable of essentially hiding an animal from view.

SHELTERWOOD CUT. Removal of the mature stand of timber in a series of cuts. Regeneration of the new stand occurs under the cover of a partial forest canopy between cuts. A final harvest cut removes the shelterwood and permits the new stand to develop in the open as an even-aged stand.

SMSA. Standard Metropolitan Stastical Area. A county which contains at least one city of 50,000 inhabitants plus any adjacent urban territory.

SOILS. See soils terms defined in Appendix F.

STRATEGIC MINERALS OR MATERIALS. Those materials vital to the security of a nation which must be procured entirely or to a substantial degree from sources outside the continental limits of that nation because the available production will not be sufficient in quantity or quality to meet requirements in time of national emergency.

TACK-ON. A parcel of public land that is less than 5,000 acres in size, possesses the wilderness characteristics of naturalness and outstanding opportunities for solitude or primitive recreation, and is adjacent to other federal land that has been designated as wilderness or is being studied for wilderness designation.

TRANSHUMANCE. Seasonal geographic movements by human groups, usually repetitive, between different areas. Transhumanance is a cultural variable geared toward what a people considers to be a valuable resource.

VALID DISCOVERY. A discovery where minerals have been found and the evidence is of such a character that a person of ordinary prudence would be justified in the further expenditure of his labor and means, with a reasonable prospect of success, in developing a valuable mine, and where the requirements of the statutes have been met.

VISION QUEST. A religious vigil undertaken by Native Americans to obtain a spiritual guide. Sites indicating this activity consist of low stone cradles usually located on isolated mountains or hills.

VRM. Visual Resources Management.

WILDERNESS PROTECTION STIPULATION. A stipulation attached to post-FLMPA oil and gas leases designed to protect wilderness values.

WSA. Wilderness Study Area. A parcel of public land that through the BLM's wilderness inventory process has been found to possess the basic wilderness characteristics of being at least 5,000 acres in size, being primarily natural, and having outstanding opportunities for solitude or primitive and unconfined types of recreation.

WPA. Wilderness Planning Amendment.

WSP. Wilderness Study Policy (document).

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☆U.S. GOVERNMENT PRINTING OFFICE:1982—576-053 / 3